User's Perception on Ict Adoption For Education Support in Schools: A Survey of Secondary School Teacher's in Thika District Kenya

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Abstract

Information Communication Technology (ICT) plays a crucial role in the effectiveness, efficiency and service delivery of any institution. ICT has also been credited with the potential to integrate world economies thus demolishing the barriers created by time and distance. However, despite its role in improving service delivery, it adoption in secondary schools in Kenya has remained low and limited. The study adopted a descriptive research design approach and targeted all the public and private secondary schools in Thika district in Kenya. The findings shows that the pace of ICT adoption in both public and private secondary schools in Kenya is very slow, as characterized by: user complexity perception, inadequate IT literacy, lack of psychological and technical readiness and insufficient policy guidelines. The paper concludes that inadequate technical and psychological preparedness has belated perception change which has hampered technology acceptance and use in secondary schools. This study recommends that; Psychological and technical skill readiness of teachers needs to be addressed through increasing investment in ICT facilities, resources and training so as to reverse the slow rate of ICT adoption trend and improve the pace of diffusion in secondary schools.

Key words: User perception; Information and Communication Technologies; ICT Adoption.

1.0 Introduction

While there is a wide range of innovations in ICT to support effective and quality delivery of education services and curricula, there is a considerable technology lag in educational institutions. Most institutions still use nearly obsolete systems and are consequently unable to exploit the educational potential of the emerging technologies. This situation is amplified by demands of rapidly evolving skills in a globalizing labor market. New paradigms are also emerging whereby education service delivery becomes: less about teaching and more about learning (less "magister-centric" and more "learner-centric" via self-tutoring and the use of individualized information research abilities); increasingly less confined within the sole geographical location of learners (a country) or less dependent upon a physical space (a classroom for pooling a critical mass of learners together); and more flexible, adjustable to learners' chosen time, with modular curricula no longer constrained by rigidly formatted schooling path or by rigidly predetermined certification goals GeSCI,(2009).

Users' perceptions influence to a great extent the rate and the level of technology adoption. According to Van-Akkeren and Cavaye, (1999) the perceived usefulness and perceived ease of use influence the perception of the users while the perceptions predict attitudes toward the technology adoption. Then the attitude develops the intentions to use and the intentions cause actual system usage. The beliefs, attitude and intention to use come in place when a user is presented with a new technology. These influence the users' decision regarding how and when they will use it (Davis et al, 2002).

Acccording to Zwick, (2002), ICT developments and computerization inventions have led to automation of major tasks that were usually undertaken manually in most organizations. The effectiveness and success of ICT systems seems to depend not only on the technology itself, but also on the ways in which the users are introduced to the concept. The support of employees in introduction of new innovations is highly dependent on the type of innovation as well as the employees' perception to the inventions to be introduced (Zwick, 2002).

The ICT development in education has changed the users' behaviors and their view on modern technology. A study by Cairns (2003) showed that attitude, Motive, Interest, expectation and past experience has a positive effect on acceptance of ICT, and its ease in usage greatly effects its adoption. However, for ICT adoption and implementation to succeed, it must gain user acceptability, the system must be secure (both in reality and consumer perception), convenient, easy to use and be offered at little or no additional cost to the consumer (Antovski and Gusev 2003).

2.0 ICT Models and Theories on ICT User Perception and Adoption

2.1 Technology acceptance model (TAM)

The Technology Acceptance Model (TAM) is a theoretical model that explains how users come to accept/adopt and use a technology. Original TAM was proposed by Davis in 1989. The model suggests that when a user is presented with a new technology, a number of factors influence their decision regarding how and when they will use it. This includes its perceived usefulness and its perceived ease of use. However, the TAM does not account for the influence and personal control factors on behavior. Other factors such as economic factors, outside influences from suppliers, customers and competitors are also not considered by the TAM (van Akkeren and Cavaye, 1999). This model adopts well established causal chain of "beliefs, attitude, intention, actual behavior", which was developed from the theory of reasoned action by social psychologists. In Davis's study, two important constructs are identified; perceived usefulness and perceived ease of use Davis, Foxall and Pallister, (2002). These perceptions predict attitudes toward the system adoption. Then the attitude develops the intentions to use and the intentions cause actual system usage. In many recent studies regarding technology, TAM is adopted extensively. TAM was adopted and showed that it contributes to the prediction of individual usage of technology (Fishbein and Ajzen, 1989).

TAM assumes that perceived usefulness ("the degree to which a person believes that using a particular system would enhance his or her performance" and perceived ease of use ("the degree to which a person believes that using a particular system would be free of effort" with the influence of pre-existing external variables being the primary determinants for adoption of a new technology. Perceived ease of use has a direct effect on perceived usefulness and both determine the consumer's attitude toward use, which leads to behavioral intention to use the system and actual use of the system (Davis et al, 2002; Lu et al. 2003).

2.2 Diffusion of innovation theory

Diffusion of Innovation theory was developed by Roger's in 1995. Rogers (1995:5) defines diffusion as "the process by which an innovation is communicated through certain channels over time among members of a social system". An innovation, according to Rogers (1983:11), is "an idea, practice, or object that is perceived as new by an individual or other unit of adoption".

The innovation-diffusion model states that an innovation (technology) is passed on from its source to end users through a medium of agents and its diffusion in potential users for the most part dependent on the personal attributes of the individual user. The model assumes that the technology in question is appropriate for use unless hindered by the lack of effective communication (Negatu and Parikh, (1999:208). According to Rogers (1983), the four major factors that influence diffusion process include; innovation itself, communication, time and nature of the social system into which the technology is being introduced (Rogers, 1983). VanAkkeren and Harker, (2003:205) argues that media and interpersonal contacts provide information that influences a person's opinion and judgment. The theory comprises four elements: invention, diffusion through the social networks, time and consequences. Information filters through the networks and depending on the nature of the networks and the roles of its opinion leaders, new innovations are either adopted or rejected. Rogers further claims that there are five adopter categories that include: innovators, early adopters, early majority, late majority, and laggards.

Interestingly, the five categories follow a standard deviation curve where very little innovators adopt at the beginning (2.5%), early adopters constituting 13.5%, the early majority constituting 34%, the late majority another 34%, finally the laggards at 16%.

2.3 Review of empirical researches on ICT adoption and perception

According to Westrup et al (2003), public schools and institutions in most developing countries are increasingly facing the difficulty of managing and using the multiplicity of new ICTs, such as e-mail, voice mail, worldwide web, cell phones, and videoconferencing among others. In addition, the sheer speed and ease of use of modern ICTs only serves to amplify these challenges. Hence, ICTs is viewed as being ubiquitous in most schools and organizations. Since most public learning institutions and other public organizations progressively intents to expand into global markets, it is critical for them to know how ICTs facilitate communication (Ross, 2001).
El Shinnaway and Vinze (1997) examined the impact of technology on the outcomes of group decision-making in the United States of America (U.S.A) and Singapore. They found out that ICTs do indeed have an impact on group decision outcomes such as polarization. However, the impact of ICTs is quite different on the culture that dictates the norms under which a group operates. Straub (1994) studied the effect of organizational culture on IT diffusion of e-mail and fax in Japan and the U.S.A. His findings suggest that culture plays an important role in the predisposition towards selection of ICTs. However, findings on the use of face-to-face and telephone were similar between these two countries.

Leidner, Carlsson, Elam, & Corrales (1999) drew on survey responses from managers using Executive Information Systems (EIS) across organizations in Mexico, Sweden, and the United States. Their study examined whether cultural differences influence perceptions of the relationship between EIS use and decision-making outcomes. The study found significant differences, predicted by cultural factors, in the impact of EIS use on senior management decision-making. Hofstede (2000) investigated the specific attributes of organizations that influence ICT adoption speed. The findings established that cultural variables (individualism and uncertainty avoidance) might be used to predict the ease and speed of changes. Cultures of high uncertainty avoidance are slow in adopting new technologies.

The 'social context' of ICT development and use plays a significant role in influencing the way in which people use and develop information technologies (Cairns, 2003). A study by Cairns (2003) found out that configurations of local computing packages (including support resources and information structures, as well as hardware and software) were influenced by the distribution of power within in the organization and often reinforce existing power relations. Technology adoption needs to be seen within the context of the inequalities, complexities and uncertainties of organizational life.

3.0 ICT Adoption in Kenya Secondary Schools

The adoption and use of ICTs in education institutions in developing countries remains very limited despite a decade of large investment in information and communication technologies (Trucano, 2005). Kenya like other developing countries struggles with high levels of poverty and this has an effect on the adoption and access to ICT (OECD, 2004). The initial aim to introduce ICTs in education was primarily at developing ICT skills, the focus has over time shifted to leverage ICTs to address issues of quality and to improve teaching and learning especially at secondary and post secondary levels. However, availability and use of ICTs at various levels is still patchy. About 1,300 secondary schools out of more than 6,000 schools have computers, while most schools with computers use less than 40% of the available infrastructure and very few actually use ICT as an alternative method for curriculum delivery. This shows a very slow integration pace and may lead to all benefits of ICT in schools un-equitably realized or not being realized in the near future. Many teachers perceive that adoption of ICT in school will leader them jobless due to it foreseen benefits such as e-learning and efficiency in the mode of delivery (Kenya ICT survey, 2007).

The main objective of this study was to assess the users' perception in electronic mode of curricula delivery; complexity in use; ICT refresher courses and job security on adoption of ICT for educational support activities in secondary schools in Kenya, through a survey in Thika district.

3.1 Research methodology

This study adopted a descriptive survey design incorporating both qualitative and quantitative research approaches.

The population of the study was the school management and the teachers involved in ICT implementation in secondary schools in Thika District. The sampling techniques adopted in this study included; Stratified, simple random and purposive techniques. Stratified techniques was used to group the target population (Thika secondary schools) into two main strata namely; public and private schools. Then from each category, a 30% sampling computed to ascertain the number of schools to be sampled. The study targeted a total of 92 respondents, however due to study limitations; the study gathered a total of 86 responses which represents 93.5% response rate. These provided insights on perception and the pace of ICT adoption in secondary schools.

Table 1: Sampling Frame

Institutions	Total Number of schools	Sample Percentage	Schools in each category	Respondent from each school	Sample size
Public schools	62	30%	19	3	57
Private schools	25	30%	7	5	35
TOTAL	**87**	**30%**	**26**	-	**92**

From each of the sampled schools, five and three respondents were sampled purposively from private and public school, were in private were more than in public schools to reduce disparities for comparison purposes as shown in Table 1 above. Primary data was collected using questionnaires that contained both open and closed ended questions. Data was analyzed using statistical package for social sciences (SPSS) using statistical tools; percentages, frequencies, means, standard deviations, ANOVA , chi-square as well as interpretational analysis used to identify constructs, themes and patterns that were used to describe and explain issues being studied (Gall, Borg, and Gall, 1996).

4.0 Users' Perceptions on ICT Adoption

The study targeted a total of 92 respondents, however due to study limitations; the study gathered a total of 86 responses which represents 93.5% response rate. The users' perceptions on ICT adoption was assessed through a five-point Likert scale where by the means and the standard deviations of their responses were computed. The findings are discussed in the subsequent sub-sections.

4.1 Pedagogy perceptions

Through a five-point Likert scale, the findings show that on average, the respondents in public schools were not sure whether they preferred manual pedagogy skills as opposed to electronic modes of curricula delivery as accounted by total mean of 3.53, while those in private and HOD ICT in public preferred electronic mode at a mean of 3.58 and 3.76 as shown in Table 2 below. However, the users in public schools were evasive on whether to adopt electronic mode of delivery or not. This shows that the users in private schools and HOD ICT in public perceived electronic mode of delivery to be more beneficial to schools as compared to manual mode. In addition, the high number of uncertainty and manual preference in public shows a prolonged delay in acceptance and use of emerging technologies in class. Thus manual instruction modes will stay longer than anticipated since using ICT support activities in class is patchy, incoherent and far from being realized. The chi-square test was none significant, which implied that the instruction mode preference was independent of school category.

Table2: Manual Teaching Preferred to Electronic Mode

Nature of the school	Respondent title	Mean	N	Std. Deviation
Public	IT Teacher	3.41	27	1.474
	Administrator	3.44	9	1.333
	HOD ICT	3.76	17	1.480
	Total	3.53	53	1.436
Private	IT Teacher	3.38	16	1.455
	Administrator	3.90	10	1.101
	HOD ICT	3.57	7	1.272
	Total	3.58	33	1.300

KEY: 1.00–1.55-strongly agree; 1.56–2.55-agree; 2.56–3.55–neutral;
3.56 – 4.55, - disagree; 4.56 – 5.00, - strongly disagree.

However, on average administrators and the heads of ICT department disagreed that, they preferred manual teaching as opposed to electronic mode of curricular delivery as accounted by the means of 3.68 and 3.71. The total respondents mean of 3.55 and overall IT teachers mean of 3.40 shows indecision on the issue as shown in Table 3 below.

Table 3: Manual teaching preferred to Electronic mode

Respondent title	Mean	N	Std. Deviation
IT Teacher	3.40	43	1.450
Administrator	3.68	19	1.204
HOD ICT	3.71	24	1.398
Total	3.55	86	1.378

KEY: 1.00–1.55-strongly agree;   1.56–2.55-agree;   2.56–3.55–neutral;
3.56 – 4.55, - disagree;   4.56 – 5.00, - strongly disagree.

The study compared the preference of manual to electronic mode to asses if there was any significant difference in private and public schools or between respondent title. Through, a null hypothesis which stated that *there is no significant difference in preference between public and private schools nor among respondent title in Thika district* with the alternate hypothesis stating that *there is a significant difference on preference*. Analysis of Variance (ANOVA) test showed that there was no significant difference, with mean of public being **3.53** (neutral) and **3.58** (disagree) for private, while overall mean for respondent title was **3.55** (neutral). This implies that teacher instruction mode preference is independent of school nature and teachers title.

4.2 Teacher-student contact perceptions

On average, the respondent were evasive that use of ICT facilitated class activities will deny student physical contact with their teachers; as supported by total means of 3.38 for public and 3.27 for private schools respectively as shown in Table 4 below. The uncertain views of the users whether the introduction of ICT instruction activities in class would deny the students their teacher physical contact shows uncertainty in technology usage which has derailed the efforts of ICT integration in schools.

Table 4: ICT Make student lack physical touch with their teachers

Nature of the school	Respondent title	Mean	N	Std. Deviation
Public	IT Teacher	3.44	27	1.340
	Administrator	3.00	9	1.581
	HOD ICT	3.47	17	1.546
1	Total	3.38	53	1.431
Private	IT Teacher	3.31	16	1.448
	Administrator	3.10	10	1.663
	HOD ICT	3.43	7	1.397
	Total	3.27	33	1.464

KEY: 1.00–1.55-strongly agree;   1.56–2.55-agree;   2.56–3.55–neutral;
3.56 – 4.55, - disagree;   4.56 – 5.00, - strongly disagree.

The overall respondent title comparison yielded similar results with average of 3.34 (neutral) as shown in Table 5 below.

Table 5: ICT reduces Teacher to student physical touch

Respondent title	Mean	N	Std. Deviation
IT Teacher	3.40	43	1.365
Administrator	3.05	19	1.580
HOD ICT	3.46	24	1.474
Total	3.34	86	1.436

KEY: 1.00–1.55-strongly agree; 1.56–2.55-agree;2.56–3.55–neutral;
3.56 – 4.55, - disagree;   4.56 – 5.00, - strongly disagree.

The perception that student may lack teachers physical touch during curricula delivery is a strong indicator of unawareness of integral potential that technologies have to offer in educational institutions. This shows inadequacy in psychological and technical preparedness which hampers ICT integration, causing a haul that may lead to a wider digital divide among schools and between developed and developing economies. This was further supported by none significant ANOVA test showing that interpersonal contact influence users opinion and judgment as suggested by Rogers, (1983).

4.3 Complexity perceptions

Using ICT activities in class was too complex as perceived by total means of 3.66 and 3.76 in public and private respectively. The findings are shown in Table 6 below.

Table 6: ICT use in class is not too complex

Nature of the school	Respondent title	Mean	N	Std. Deviation
Public	IT Teacher	3.85	27	1.262
n2	Administrator	3.33	9	1.323
	HOD ICT	3.53	17	1.281
	Total	3.66	53	1.270
Private	IT Teacher	3.44	16	1.459
	Administrator	3.90	10	1.197
	HOD ICT	4.29	7	.756
	Total	3.76	33	1.275

KEY: 1.00–1.55-strongly agree;   1.56–2.55-agree;   2.56–3.55–neutral;
3.56 – 4.55, - disagree;   4.56 – 5.00, - strongly disagree.

The means of respondent opinions supports disagreement that ICT usage is not too complex, implying that in general there is significant challenges in ICT integration as shown in Table 7 below.

Table 7: ICT use in class is not too complex

Respondent title	Mean	N	Std. Deviation
IT Teacher	3.70	43	1.337
Administrator	3.63	19	1.257
HOD ICT	3.75	24	1.189
Total	3.70	86	1.266

KEY: 1.00–1.55-strongly agree;   1.56–2.55-agree;   2.56–3.55–neutral;
3.56 – 4.55, - disagree;   4.56 – 5.00, - strongly disagree.

The findings show that ICT usage in support of teaching and learning activities is perceived as complex. The non significant ANOVA test implies that complexity attitude is similar in both school categories and across respondent titles which according to Davis et al, (2002) leads to behavioral intention to use technology and actual usage. This implies that there is inadequate human capacity for ICT integration in schools, leading to low or absence of ICT use for content delivery. Complexity in usage perception will not only slow technology acceptance rate, but will also delay the actual benefits of ICT integration in learning institutions. These may be attributed to inadequate technical readiness of users, leading to low levels of IT skilled personnel's in schools hence denying students the robust and universal digitized learning resources. This agrees with Westrup et al, (2003) that public schools and institutions in developing countries are increasingly facing difficulty of managing and using ICTs.

4.4 Employment security perceptions

On average, respondent from both public and private schools were tolerable to ICT integration; though incorporating ICT in day to day learning activities seemed unsecure to some. Perception of job opportunity reduction was not clear in both public and private schools as accounted by the 3.55 and 3.33 overall neutral responses in public and private schools respectively as shown in Table 8 below.

The perception of job insecurity coupled with overall indecisive responses has lead to a technology acceptance lag, thus hampering efforts of achieving vital national goals like MDGs and Vision 2030.

Table 8: Adoption of ICT reduces job opportunities

Nature of the school		Respondent title	Mean	N	Std. Deviation
Public		IT Teacher	3.67	27	1.177
	2	Administrator	3.00	9	1.323
		HOD ICT	3.65	17	1.222
		Total	3.55	53	1.218
Private		IT Teacher	3.13	16	1.088
	n2	Administrator	3.50	10	1.354
		HOD ICT	3.57	7	1.618
		Total	3.33	33	1.267

KEY: 1.00–1.55-strongly agree;   1.56–2.55-agree;   2.56–3.55–neutral;
3.56 – 4.55, - disagree;   4.56 – 5.00, - strongly disagree.

Similarly overall IT teachers and administrators were neutral towards adoption of ICTs reducing job opportunities while heads of ICT departments disagreed as shown in Table 9 below.

Table 9: Adoption of ICT reduces job opportunities

	Respondent title	Mean	N	Std. Deviation
	IT Teacher	3.47	43	1.162
n2	Administrator	3.26	19	1.327
	HOD ICT	3.63	24	1.313
	Total	3.47	86	1.234

KEY: 1.00–1.55-strongly agree;   1.56–2.55-agree;   2.56–3.55–neutral;
3.56 – 4.55, - disagree;   4.56 – 5.00, - strongly disagree.

The ANOVA test result was insignificant implying that job retention uncertainty issues across all school and respondent categories were similar.

4.5 IT Literacy course perceptions

On average, respondents in public and private schools were not sure on whether re-training teachers on ICT skills will waste class time as accounted by 2.94 and 3.00 respectively. Most respondents remained evasive about the attribute as shown in Table 10 below. Mass training and re-training of teachers on ICT usage in educational activities would prepare them materially, psychologically and enhance their technical skill readiness. Absence of a planned literacy courses for teachers as given them a leeway on when and how to acquire the requisite skills.

Table 10: ICT requires teachers to be re-trained which wastes class time

Nature of the school		Respondent title	Mean	N	Std. Deviation
Public		IT Teacher	2.85	27	1.292
		Administrator	3.11	9	1.364
		HOD ICT	3.00	17	1.620
		Total	2.94	53	1.392
Private		IT Teacher	2.63	16	1.258
	2	Administrator	3.60	10	1.350
		HOD ICT	3.00	7	1.000
		Total	3.00	33	1.275

KEY: 1.00–1.55-strongly agree;   1.56–2.55-agree;   2.56–3.55–neutral;
3.56 – 4.55, - disagree;   4.56 – 5.00, - strongly disagree.

The refresher courses for teachers in secondary schools on ICT application and usage are limited, irregular and unclear as overall mean for respondent title **2.97** shows uncertainty as shown in Table 11 below.

Table 11: ICT requires teachers to be re-trained which wastes class time

Respondent title	Mean	N	Std. Deviation
IT Teacher	2.77	43	1.269
Administrator	3.37	19	1.342
HOD ICT	3.00	24	1.445
Total	2.97	86	1.341

 KEY: 1.00–1.55-strongly agree;   1.56–2.55-agree;   2.56–3.55–neutral;
  3.56 – 4.55, - disagree;   4.56 – 5.00, - strongly disagree.

Prolonged rejection of emerging technologies does not only cause skills to be obsolete but acts as roots for irrelevant curricula with its output, as education system lags on negative edge of digital divide. Further none significant ANOVA test implied that attendance to IT literacy courses and skill attainment is still unclear for secondary school teachers.

4.6 E-Learning workshop/ conferences perceptions

Table 12 shows the means of the responses on the nature of the school and attendance of E-learning Workshops and Conferences. On average 3-4 teachers have attended an e-learning workshop or conference from both public and private schools as accounted by their respective total means of 2.66 and 3.24, though observation by administrators in private schools show that 7 to 10 teachers have attended an e-learning workshop with a mean of 4.00.

Table 12 : Attendance of E-learning Workshops and Conference

Nature of the school	Respondent title	Mean	N	Std. Deviation
Public	IT Teacher	2.63	27	1.573
	Administrator	3.11	9	1.833
	HOD ICT	2.47	17	1.586
	Total	2.66	53	1.605
Private	IT Teacher	2.94	16	1.948
	Administrator	4.00	10	1.633
	HOD ICT	2.86	7	2.035
	Total	3.24	33	1.888

 KEY: 1.00–1.55- None;   1.56–2.55-less than 3 teachers;   2.56–3.55– 4 – 6 teachers;
  3.56 – 4.55, - 7 – 10 teachers;

The overall opinion is that about 4 to 6 teachers have attended e-learning conference with a mean of 2.88, as that of administrators at 7 to 10 teachers having been involved as shown in Table 13 below.

Table 13: Attendance of E-learning Workshops

Respondent title	Mean	N	Std. Deviation
IT Teacher	2.74	43	1.706
Administrator	3.58	19	1.742
HOD ICT	2.58	24	1.692
Total	2.88	86	1.731

 KEY: 1.00–1.55- None ;   1.56–2.55- less than 3 teachers;   2.56–3.55–4 – 6 teachers;
  3.56 – 4.55, - 7 – 10 teachers;

This implies that there is little effort by the teachers and the schools' management to encourage teachers to attain e-learning skills.

The perception that ICT is not relevant to national examinations, coupled with absence of a clear policy frame work on integration, refresher courses and e-learning workshops has influenced teachers negatively in search of requisite pedagogical skills.

4.7 ICT support and sustainability

There is a considerable uncertainty in both public and private schools of whether ICT aided programs are sustainable or not. Also there is unclear support in terms of technical skills, facilities and upgrades, with total means of 2.96 (neutral) and 2.94 (neutral) for public and private schools respectively as shown in Table 14 below.

Table 14: There is fear of ICT support sustainability

Nature of the school		Respondent title	Mean	N	Std. Deviation
1	Public	IT Teacher	3.00	27	1.301
	n2	Administrator	2.33	9	1.225
		HOD ICT	3.24	17	1.091
		Total	2.96	53	1.240
	Private	IT Teacher	2.56	16	.964
		Administrator	3.00	10	1.491
		HOD ICT	3.71	7	1.380
		Total	2.94	33	1.273

KEY: 1.00–1.55-strongly agree;   1.56–2.55-agree;   2.56–3.55–neutral;   3.56 – 4.55, - disagree;   4.56 – 5.00, - strongly disagree.

This implies intangible and un-observable support of ICT integration in secondary schools has influenced its diffusion rate where users and managers have a dilemma on actual implications. Despite ICT relative advantage, compatibility and tolerance, its implementation in secondary schools is merely on trial as managers wait to observe trends un fold due to the perceived fear. Additionally, all IT teachers, administrators and heads of department were unsure of the ICT support in schools with means of 2.84, 2.68 and 3.38 respectively as shown in Table 15 below.

Table 15: There is fear of ICT support sustainability

Respondent title	Mean	N	Std. Deviation
IT Teacher	2.84	43	1.194
Administrator	2.68	19	1.376
HOD ICT	3.38	24	1.173
Total	2.95	86	1.245

KEY: 1.00–1.55-strongly agree;   1.56–2.55-agree;   2.56–3.55–neutral;   3.56 – 4.55, - disagree;   4.56 – 5.00, - strongly disagree.

Continued adoption and use of emerging technologies is vital in any education system committed at bridging a digital gap or at realizing a knowledge economy in a nation. Perceived fear of support sustenance has led slow adoption rate, discontinuance and even rejection which is argued by Rogers model of innovation as consequence that contribute to lags in adoption (Rogers 1995).

4.7 Ease of use of computer applications perceptions

The respondents rated the ease of use of computer applications in class for content delivery as complex. According to IT teachers, administrators and heads of departments in both public and private schools, the use of computer applications in class for content delivery is complex as accounted by the means of 3.00 (complex) and 2.64 (complex) in public and private schools respectively as shown in Table 16 below.

Table 16: Ease of use of Computer Applications

Nature of the school	Respondent title	Mean	N	Std. Deviation
Public	IT Teacher	2.93	27	1.591
	Administrator	3.67	9	1.323
	HOD ICT	2.76	17	1.640
	Total	3.00	53	1.569
Private	IT Teacher	2.50	16	.632
2	Administrator	3.00	10	1.414
	HOD ICT	2.43	7	1.134
	Total	2.64	33	1.025

KEY: 1.00–1.55-strongly agree;   1.56–2.55-agree;   2.56–3.55–neutral;
3.56 – 4.55, - disagree;   4.56 – 5.00, - strongly disagree.

This shows that most users in both public and private schools perceived computer applications in class for content delivery as complex. This could be as a result of low levels of IT skills on use of computer applications. The ease of use comparition among respondent title shows that they all percieved it as complex as accounted by their total mean of 2.86 (complex) as shown in table 17 below.

Table 17: Ease of use of Computer Applications

Respondent title	Mean	N	Std. Deviation
IT Teacher	2.77	43	1.324
Administrator	3.32	19	1.376
HOD ICT	2.67	24	1.494
Total	2.86	86	1.390

KEY: 1.00–1.55- Very easy;   1.56–2.55- Easy;   2.56–3.55–Complex;
3.56 – 4.55, - Very complex;

The high response rate of complexity in use of computer applications shows lack of use due to poor access and inadequate technical skill readiness which hinders ICT usage. In addition ease of use of computer applications cross tabulations shows that ICT adoption perceptions are independent of age, and experience of teachers, while partly depends on level of education of respondent's as shown in Tables 18, below. This shows that complexity issues in use of ICT for curricular delivery cuts across all teacher age groups as both less experienced and more experienced teachers viewed ICT usage as complex. Implying the manual instruction experience attained does not enhance technology uptake.

Table 18 : Ease of ICT use in class and Level of Education

highest level of Education		Ease of use of Computer Applications				
		Very easy	Easy	Complex	very complex	Total
Diploma	IT Teacher	25.0%	62.5%	12.5%	.0%	100.0%
	Administrator	.0%	60.0%	20.0%	20.0%	100.0%
	HOD ICT	25.0%	75.0%	.0%	.0%	100.0%
	Total	17.6%	64.7%	11.8%	5.9%	100.0%
undergraduate	IT Teacher	14.3%	21.4%	32.1%	32.1%	100.0%
	Administrator	.0%	36.4%	27.3%	36.4%	100.0%
	HOD ICT	7.1%	50.0%	7.1%	35.7%	100.0%
	Total	9.4%	32.1%	24.5%	34.0%	100.0%
postgraduate	IT Teacher	.0%	80.0%	20.0%	.0%	100.0%
	Administrator	.0%	33.3%	.0%	66.7%	100.0%
	HOD ICT	50.0%	.0%	33.3%	16.7%	100.0%
	Total	21.4%	35.7%	21.4%	21.4%	100.0%

The chi-square test was computed to assess whether ease of use was significantly dependent on level of education. The result turned significant for postgraduate teachers and insignificant for other education levels as shown in Table 19 below.

Table 19: Chi-Square Tests for Ease of use and Education level

Highest level of Education		Value	df	Asymp. Sig. (2-sided)
Postgraduate	Pearson Chi-Square	13.938	6	.030
	N of Valid Cases	14		

This implies there is significant difference in ease of use between levels of education as observed by postgraduate teachers (p<0.05).

4.8 Factor analysis for ICT user's perception

This section shows an exploratory factor analysis (EFA) based on the principal component method with varimax rotation, conducted using SPSS package to detect the factor structure regarding the user's perception.

4.8.1 Factor variable reduction

Two components out of the 6 items were extracted with eigenvalues greater than 1.00, during the first rotation, where "fear of ICT support sustainability" loading was less than 0.5 and so it was removed. The second rotation extracted only one component with all the factor variables loadings greater than 0.6. The factor variables of the extracted component were combined and formed a new variable "User attitude" whose items are listed in Table 20 and it mean in Table 21 below, showing that teacher's attitude slows ICT integration rate in schools. User attitude on ICT adoption entails individualistic opinions of acceptability and usage of technology on pedagogy, job security, ease of use and its viability for quality and timely service delivery.

Table 20: Factor on User Attitude

Items for User Attitude that shows Teacher's attitude on use of ICT's in schools as a tool for instruction
• Manual teaching preferred to Electronic mode
• ICT Make student lack physical touch with their teachers
• ICT use in class is too complex
• Adoption of ICT reduces job opportunities
• ICT requires teachers to be re-trained which wastes class time

This implies that electronic mode of curricula delivery is quite challenging to both teachers and students, which causes a considerable technology adoption lag in secondary schools.

Table 21: Mean for User Attitude

	N	Minimum	Maximum	Mean
Pedagogy uncertainties	86	1.0	5.0	3.49
Valid N (list wise)	86			

KEY: 1.00–1.55-strongly agree;   1.56–2.55-agree;   2.56–3.55–neutral;
3.56 – 4.55, - disagree;   4.56 – 5.00, - strongly disagree.

In general, the overall mean for user attitude was established as 3.49 - neutral, which shows the opinion of respondents regarding ICT adoption status in secondary schools. This result's implies that usage of e-tools is unclear patchy and unused as respondents were not certain on ICT integration needs, implications and benefits. The uptake of technology is yet to be well defined in schools where some schools with adequate ICT facilities use a negligible percentage and others does not use them at all.

5.0 Conclusions and Recommendations

5.1 Conclusions

On basis of these findings we conclude that the pace of ICT adoption in both public and private secondary schools in Kenya is very slow, as characterized by: complexity perception, which is influenced by attributes such as; inadequate IT literacy, lack of psychological and technical readiness and insufficient policy guidelines.

The paper further concludes that inadequate psychological preparedness has dragged perception change which has hampered technology acceptance and usefulness in secondary schools, creating fear of sustainability of ICT programs.

In addition, the perceived low levels of information technology literacy in secondary schools as portrayed by perceived ICT complexities limits the usage of emerging technologies in leveraging teaching and learning in secondary schools.

5.2 Recommendations

The paper recommends an increased investment strategy for improving and equipping the schools with ICT-literacy training facilities and resources for both teachers and students in Kenya to address psychological and technical skill readiness. This will leverage teacher's skills so as to reverse the slow rate of ICT adoption trend and improve the pace of diffusion in the secondary schools.

There is need for mass training and retraining of teachers on e-learning skills to enhance use, sustenance and care of systems as study established rigidity in none sustainable ICT programs. This can be achieved through organizing computer training sessions, workshops and conferences. These training can impart the needed skills to teachers and enhance care of systems and boast sustainability.

There is a need to establish a sufficient policy frame work for ICT integration in schools in order to leverage the rate of ICT integration in schools in terms of mechanisms, quality of content, trainer qualifications and system standards as we established absence and inadequacy policy guidelines.

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