

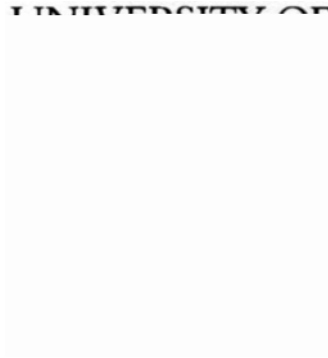
HCT – 2002

Tools for Thought: Communicating and Learning Through Digital Technology

PROCEEDINGS

6th Human Centred Technology Postgraduate Workshop

26th and 27th September 2002
Brighton, U.K.



Organisers:

Ben du Boulay
Claudia Gama
Beate Grawemeyer
Louise Hammerton

Rose Luckin
Erika Martinez
Jonathan Matthews

: CF9KCF8

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ow is interactivity affected by the characteristics of the user and by the characteristics of the system

What do the user and the system need to know about each other

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What do we mean by digital technology and how is it changing

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Cxm` 1 hb @c` oshud Nmsnknfjb`k Lncdkkkmf sn Rtoonqs Bghkcqdm&r
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Ytjdqh Haq`ghl `mc U`mh` Chl hsqnu`+ Rbgnnk ne Bn lotshmf+ Tmhudqrhsx ne Kddcr+ Kddcr+
Tmhsdc Jhmfcn l - zytjqh+ u`mh` | ? bn lo-kddcr-`b-tj

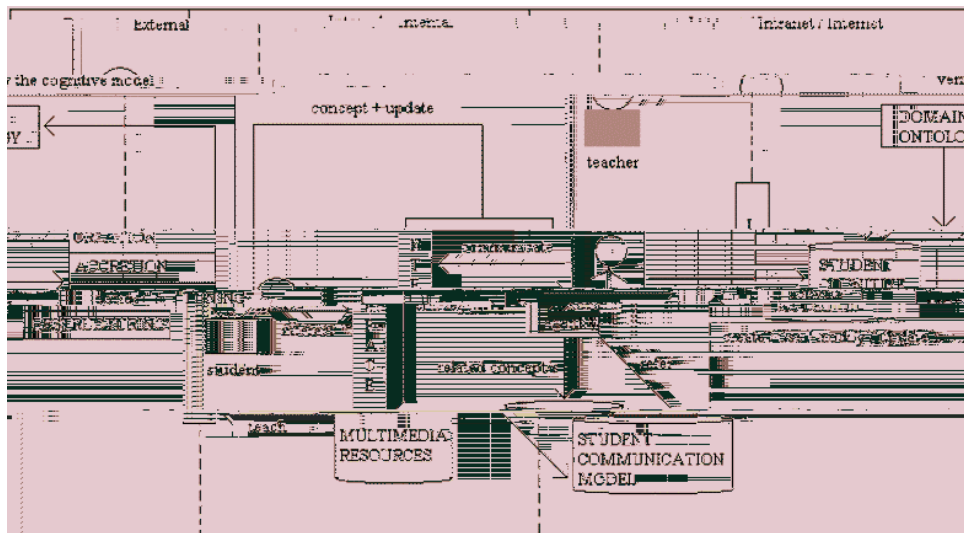
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bnmbdos- Qdrsqbstqhmfb nbbtqr he sgddq hr `m dwhrshmf rbgdl` ats hs b`mnns `bnl lnc`sd
 sgd btqqdms bnmbdos+ `mc+ gdmdbd+ ` mdv rbgdl` mddcr sn ad bq d`sd sn rtoonqs sgd
 tmcdrqs`mchmf ne sgd bnmbdos-

Sgd rbgdl` l nchehb`shnm nq bq d`shnm oqnbdrdr sg`s g`oodm hm ntq aq`hm `qd
 dwsdqm`khrdc sqqntfg bnl ltmhb`shnm- Enkknv hmf Rg`mmnm&r sgd nqx ne bnl ltmhb`shnm
 'Rg`mmnm+ 0837(+ F`l akd `mc F`l akd '0887(g`ud dwoknqdc ` gtl`m,gtl`m
 bnl ltmhb`shnm lncdk vgdqd odnokd bnl ltmhb`shmf vhsq d`bg nsgdq ok`x ansg qnkr `r`
 rdmcq nq qdbhdudq ne ldr`fdr- Sgd bnl onrshnm ne sgdrd ldr`fdr hr a`rdc nm sgd
 bnl ltmhb`snqr& ehdkc ne dwodqhdmbd `mc hr qdk`sd sn sgdhq oqhnq jmnvkdcfd- Hs b`m ad
 `qftdc sg`s hmsdq`bshud bnl otsdq stsnqr g`ud sn oquhcd ` ld`mr enq `ccqdrhmf sgd
 rstcdms&r dwhrshmf jmnvkdcfd oqnodqx hm nqcdq sn rtoonqs ghr.gdq bnmbdost`k
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@OOKXHMFB RBGDL @ SGDNQX SN SGD CDRHFM NE HSR

Sgd oqnonrde `qbghsdbstqd gdqd hr `m dwsdmrhn sn sq`chshnm`k l tkshldch` rxrsdlr- Mdv
 etmbshnm`khsx hm sdq l r ne hmsdkkhdms `fdms hr `ccdc sn dm`akd ` l tkshldch` rxrsdl sn
 bnl ltmhb`sd vhsq ` bghkc `mc dwok`hm bnmbdosr a`rdc nm rbgdl` sgd nqx- Ehftqd 0
 oqdrdmsr sgd oqnonrde `qbghsdbstqd- @ bnfms hshud lncdk ne sgd kd`qmdq hr trdc ax sgd
 hmsdkkhdms `fdms sn bnl ltmhb`sd cxm` l hb`kx `mc `c`oshudkx vhsq sgd kd`qmdq- Sgd lncdk
 hr bnmshtntrkx toc`sd ax sgd `fdms-



Ehf- 0- @qbghsdbstqd ne sgd oqnonrde rxrsdl

Sgd bnfms hshud lncdk bnms`hmr bnmbdosr kd`qmdc ax sgd bghkc hm ghr.gdq oquhnt
 hmsdq`bshnmr vhsq sgd rxrsdl- Sgd `qd `bpthqdc eqnl ` u`qhdsx ne kdrnmr kd`qmdc
 bnmshtntrkx `mc hmsdq`bshudkx ax sgd bghkc- Dudqx shld ` rstcdms hmsdq`bsr vhsq sgd
 l tkshldch` l `sdq`k sqqntfg sgd hmsdq`bd+ hs v hkk sqhfdq sgd hmsdkkhdms `fdms sn qdbhdud hsr
 s`ffdc hmenq l`shnm `r `m hmots eqnl sgd l tkshldch` qdrntqbdr- Sgd hmsdkkhdms `fdms sg`s
 etmbshnmr `r `m `bshu`snq ne dwhrshmf rbgdl`r rd`qbgdr sgd bnfms hshud lncdk enq qdkdu`ms
 rbgdl`r- He sgd `fdms ehmc ` qdk`sd rbgdl` `nq rbgdl`r(+ hs v hkk cdbhd vgdsgdq sn trd hs
 vhsqnts `mx l nchehb`shnm+ vhsq ` rkhfgs l nchehb`shnm+ nq vhsq ` l`inq l nchehb`shnm- He mn

bn l l tmb`sd vhsq sgd kd`qmdq ax rgnvhmf gh l.gdq sdwst`kkx `mc fq`oghb`kkx gnv sgd
btqqdms bnmbdos hr qdk`sd sn sgd nsgdq bnmbdosr gd.rgd g`r kd`qmdc adenqd-

Sgd l`hm qnkd ne `gt l`m sd`bgdq hm sghr bn l otdq,rtoonqsd dmuhqnm l dms hr sn
udqhex sgd u`khchsx ne sgd rstcdms&r bnfmhshud l ncdk bqd`sd `tsn l`shb`kkx ax sgd rxrsd l

1-1 Rtaidbsr

Bnmrhrs dms v hsg sghr+ vgdqd a`bjfqntmc jmnvkdcfd v`r knv hm ` o`qshbtk`q qdoqdrdms`shnm`k
sxod `r l d`rtqdc ax sgd rdbnmc oqd,sdrs(sghr l d`mr rtaidbsr cn mns trd hs+ nq vgdms sgdxcn
@mc hs g`qc sn hmsdqoqds- Gnv duduq+ ` qdrtkv vghbg bnmsq`chbsr sgd @qrs hr sg`s rn l d odnokd `qd
udqx fnnc hm bgnrhmf sgd nosh l`k qdoqdrdms`shnm ' l d`rtqdc ax rodde `mc bnqqdbmsdr ne `m,
r v dqhm f(+ qd`dbshmf sgdhq ghfg a`bjfqntmc jmnvkdcfd- Sgd rd qdrtkr `qd oqdkh l hm`qx `mc rn l d
rdd l bnmsq`chbsnqx+ ats sgdxc `kqd`cx rtf fdrs sg`s sgdqd `qd hmchuhct`k cheedqmbdr hm sgd trd ne
DQr rte@bhdms sn l nshu`sd sgd cdudkno l dms ne trdq, l ncdkr hm `tsn l `shb hmenq l `shnm uhr t`khy`,
shnm dm fhmdr- @ etkkdq `m`kxrhr+ snfdsgdq v hsg h l okhb`shnmr+ v hkk ad oqdrdmsdc `s sgd vnqjrgno-

2 Bnmbktrhnm

Hmenq l `shnm `mc s`rj fn`kr fn rn l d v`x snv`qcr l `sbghmf qdoqdrdms`shnmr sn s`rjr `mc trdqr+
ats trdqr `krn cheedq hm sdq l r ne hmchuhct`k cheedqmbdr hm qdoqdrdms`shnm`k oqdedqmbdr `mc e`,
l hkh`qhsx v hsg o`qshbtk`q sxodr ne DQr- Gdmbd+ sgd mdws og`rd ne hmsdkkhfdms hmenq l `shnm uhr t`k,
hy`shnm rxrsd l qdrd`qbg rgntkc `ccqdr `c`oshuhsx sn hmchuhct`k cheedqmbdr adsvddm trdqr- Trdq
l ncdk hmf hr nmd sdbgmhptd sn cn sghr- Sgd jmnvkdcfd `ants gnv trdqr l `jd cdbhrhnmr `mc @mc
`rnk tshnm enq sgdhq qdpthqdc s`rj hm `m DQ rgntkc ad hmbktcdc hm ` trdq l ncdk- Hcd`kx+ ` rxrsd l
rgntkc `bbn l l nc`sd hmenq l `shnm `mc s`rj fn`kr `mc `krn ad `c`oshud sn sgd trdq&r qdoqdrdms`,
shnm oqdedqmbdr- Sgd c`s` f`sgdqdc hm sghr ohkns rstex qdoqdrdms sgd @qrs rsdo hm hmenq l hm f sgd
cdrhfm ne ` trdq l ncdk enq @HUD+ `m`c`oshud rxrsd l b`o`akd ne s`hknqhm f hmenq l `shnm chrok`xr
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Khudqonnk Ingm Lnnqdr Tmhudqrhxs+ Axqn l Rsqdds+ Khudqonnk K2 2@E+ T J

D1`h9 [b l r v i`mu ? khui l`-b-t-j](#) % [b-fg`nth ? khui l`-b-t-j](#)

0 Hmsqnc tbsnm

Sghr o`odq hr a`rdc nm sgd Qdrd`qbg Gxonsgdrrr sg`s @Vgdm `m hmsdkkhfdms chrs`mbd kd`qmhmf snnk hmsdq`bsr vhsq sgd kd`qmdq trhmf ghr.gdq Bn l l tmb`shnm Oqdedqdbd K`mft`fd O`ssdqmr+ Kd`qmhmf Rsxkdr `mc Lnshu`shnm`k qdpthqd l dmsr hs hmbqd`rdr sgd Gt l`m Bn l otisdq Hmsdq`bshrm 'GBH(bn l l tmb`shnm b`o`ahkhsx `mc+ sgr+ dm`akdr sgd kd`qmdq sn kd`qm l nqd deedbshudkx `mc d`rhkx,-

1 Cn l`hm Dwodqshrd hr mns udqx Fdmdqhb

ZL tqq`x 0886\ bnmrhdqr sg`s cn l`hm dwodqshrd hr mns udqx fdmdqhb- @r` qdrtk ne sghr sgd odc`fnfx,nqhdmsdc rxrsd l r sdmc sn g`ud cheedqdm qdoqdrdms`shnm`k rbgdl dr `mc cheedqdm sd`bghmf rsq`sd fhd r enq rdudq`k cheedqdm jmnvkdcfd sxodr trhmf rh lokd nudqk`x rstcdms l ncdkr+ vghkr odqng l`mbd,nqhdmsdc rxrsd l r sdmc sn hmbnqonq`sd l nqd bn lokdw oqnbdc t qdr `mc g`ud l nqd ehmd,fq`hmdc rstcdms l ncdkr bntokdc vhsq rh lokhrshb hmrsqtbsnm`k rsq`sd fhd r- Sgr sgd bg`kdmfdr ne cdudknohm f fnc `tsgnqhm f snkr g`ud bnmrsq`hmdc cdudknodqr sn enbr sgdhq deenqr nm nmd nq sgd nsgdq- ZR onqqd 1//0\ ghfgkhfgsr sgd qdpthqd l dms enq nmd,sn,nmd hmsdq`bshrm adsvddm kd`qmdq `mc stsnq sghr hr q`qdkx oq`bshb`k hm sgd l ncdqm tmhudqrhxs- ZCih`m ds `k- 0888\&r qdrd`qbg hmchb`sdr sg`s sgd inhmmf ` Chrs`mbd Kd`qmhmf Snnk 'CKS(vhsq `m Hmsdkkhfdms Stsnqhm f Rxrsd l 'HSR(oqnc t bhm f ` fdmdqhb Gt l`m,Bdmsqdc HSR snnk enq sgd Vnqk,Vhcd,Vda g`r `kns sn needq sn sgd cheedqdm trdqr bmbdqmdc vhsq rtbg ` snk dmbn l o`rrhm f+ enq dw`l okd+ @u`s`qr+ M`stq`k K`mft`fd 'MK(+ Mdtqn,Klmfthrshb Oqnfq`l l hm f 'MKO(+ L tksh,lnc`khsx+ @tsnmn l ntr Gxodqhmj Rd`qbg hmf+ khmjhm f.trhm f nsgdq HSR nq hmeddc `mx nsgdq cdudkno l dms sg`s vntk etqsgdq sgd `ahkhsx ne ` CKS sn deedbshudkx `mc deehbdmskx hmsdq`bs vhsq dudqx kd`qmdq vgn trdr sgd rxrsd l-

2 Bn l l tmb`shnm Oqdedqdbd

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3 Kd` qmhmf Rsxkdr-

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Mcuj{. G0= Vjqppguugp. O0= Cndgtvgnk. I0= Vuck. [0 *4222+ Korngogpvkpi c Nctig Qp/
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**DWSDQM@K QDOQDRDMS@SHNM NE SGD RSTCDMS&R
JMNVKDCFD HM @ VDA,A@RDC KD@QMIMF DMUHQNMLDMS**

QHBB@QCN L@YY@
TMHUDQRHSX NE SGD HS@KH@M E HO

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Gtkmc"Cppcdgn"Octv|pg|"Okt»p

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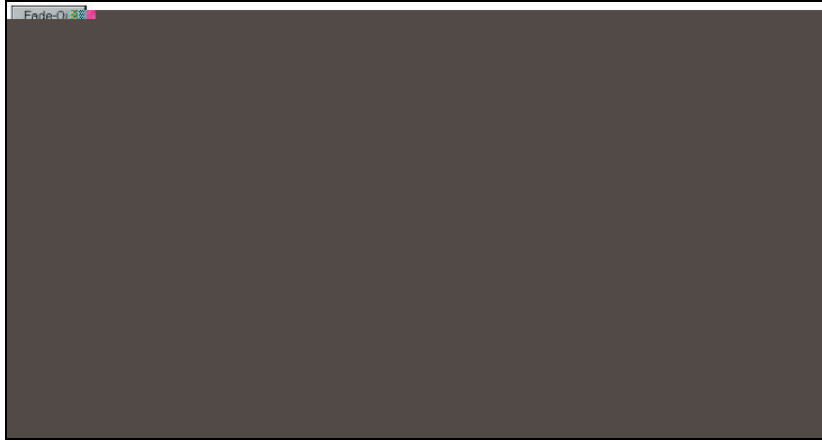
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- :+

m s otiv tion h t t h rs n to know h rs oll g or

m s hi v m nt go ls motiv tion lim t n motiv tion l pro ss s n
o rts otiv tion in sport n x r is pp
m s l ssrooms o ls stru tur s n stu nt mo



Hki"30"Rgp/cpf/rcrgt"xgtukqp"qh"vjg"RCN"Vqqn

I qcnu"qh"vjg"Rknqv"Uvwf {

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s0 vk s v

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hmsdqodqrnm`k tmcqrs`mchmf hmunkudr @gntfgs ataakdr, 'be- Q`idmcq`m % Lhsbgdkk
1///(-

@ etqsgdq hmnnu`shnm hr rsq`hfgsenqv`qc ats onsdmsh`kkx rhfmehb`ms- Sgd sdmcdmbx hm
rnbh`k rsnqhdr `mc @l hmc ,qd`chmf, dwdqbhrdr hr sn oqdrdms `rsnqx nq rb

Bqn l ax I+ Rs`rncdm o- I+ Aqnv m C-D- % Md

©

h

Vq y ct fu"cp"Kpvgthceg"v j cv"Ghhgevkxgn{" j gnru"kp" Tgnkgxkp i "Wugt"Htwuvtcvkqp"

htq o " v j g " t g u w n v u " q h " v j g u g " o g c u w t g o g p v u " v j c v " v j g " w u g t u " g o q v k q p c n " u v c v g " c v " c p { " v k o g " e c p " d g " o q p k v q t g f 0 ""

Q p e g " w u g t u " p g i c v k x g " g o q v k q p " j c u " d g g p " q d u g t x g f " c i g p v u " c t g " v j g p " w u g f " v q " j g n r " k p " v t { k p i " v q " t g f w e g " w u g t " h t w u v t c v k q p 0 " " M n g k p " * 3 ; ; ; + " k p " j k u " v j g u k u " f g u e t k d g u " c p " c i g p v " v j c v " c e v k x g n { " j g n r u " t g n k g x g " w u g t " h t w u v t c v k q p 0 " " V j g " C i g p v " w u g f " u q e k c n " g o q v k q p c n " e q p v g p v " h g g f d c e m " u v t c v g i k g u . " y j k e j " c t g " w u g f " d { " j w o c p " n k u v g p p g t u 0 " " K p " v j k u " v j g u k u " g x k f g p e g " j c u " d g g p " r t q x k f g f " v j c v " w u g t u " e c p " d g p g h k v " h t q o " c " e q o r w v g t " v j c v " t g u r q p f u " k p " c " u q e k c n n { " c r r t q r t k c v g " y c { " w u k p i " v j g " h q n n q y k p i " v g e j p k s w g u . " c e v k x g " n k u v g p k p i " * U e c t p c v k . " 3 ; ; ; + . " g o r c v j { " * J q f i g u " c p f " M n g k p . " 4 2 2 3 + " c p f " u { o r c v j { " u m k n n u 0 "

C h h g e v k x g " E q o r w v k p i " e c p " d g " w u g f " y k v j k p " v j g " e q p v g z v " q h " k p v g n n k i g p v " c p f " C f c r v k x g " U { u v g o u " k p " q t f g t " v q " e t g c v g " c r r n k e c v k q p u " v j c v " e c p " v t w n { " o g g v " c n n " q h " v j g " w u g t u " p g g f u " c v " v j g " k p v g t h c e g " h t q o " v j g " w u g t u " i q c n " u v c v g " v j t q w i j " v q " v j g k t " g o q v k q p c n " u v c v g 0 "

K p k v k c n " G z r g t k o g p v "

V j g " h t u v " g z r g t k o g p v " y k n n " d g " c " t g r g c v " q h " M n g k p o u " * 3 ; ; ; + " E q o r w v g t " T g u r q p u g " v q " W u g t " H t w u v t c v k q p 0 " " Y k v j k p " v j g " q t k i k p c n " g z r g t k o g p v . " y j k e j " y c u " k p " v j g " e q p v g z v " q h " c " i c o g . " v j g " u { u v g o " h t w u v t c v g f " w u g t u " d { " k p e n w f k p i " f g n c { u " y k v j k p " v j g " i c o g 0 " " V j g " v j t g g " v j g t c r { " e q p f k v k q p o u " v j c v " y g t g "

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bnmbdos ne aqd`jcnvmr Z02\+ sn rsqdr rsgd chrqtoshnm sg`s `qsde`bsr b`m b`trd sn sgd m`stq`k bntokhmf
sg`s gt l`m adhmfr drs`akhr g vhs g dwsdqm`k `mc hmsdqm`k qdrn tqbdr-

Methodology

Vd dla`qjdc nm svn hmsdq,qdk`sdc ehdkc rstchr vhs g sgd naidbshud ne nodmhmf `vhmcnv ne
nardqu`shnm nm svn cheedqdm+ ats bn l okd l dms`qx+ rbdm`qhr ne vnqj⁹ knb`kkx rht`sdc bnkk`anq`shnm
`mc l nahkd bnkk`anq`shud vnqjhmf oq`bshbdr- Sgd knb`kkx rht`sdc bnkk`anq`shnm enbtrdc nm sgqdd
cdrhfm sd`lr hm ehwdc `mc chrsqhatsdc knb`shnmr: vghkd sgd qdrd`qbg nm l nahkd vnqj knnjdc `s
bnkk`anq`shnm hm jmnvkdcfd vnqj hm `u`qhdsx ne qd lnsd `mc l nahkd rdsshmfr , rtbg `r `s `hqonqsr
`mc nm sq`hmr-

Observations

Rht`sdc `mc chrsqhatsdc rstcx⁹ Sgd cxm`l hb vnqj oq`bshbdr hm ntq rht`sdc `mc knb`kkx chrsqhatsdc
rstcx v`r bg`q`bsdqhrdc ax sgd fdmdq`shnm ne @bqd`shud bnmsdmsr, 'bnmbdos cdrhfm ne hmenq l`shnm
`ookh`mbr+ `qbghsdbstq`k `mc dmfhmddqhmf rodbheib`shnmr(- Sghr fdmdq`kkx nbbtqqdc vhs gnts sgd



Ehf tqd 0- S vn dwodqh l dms`k bnmchshnmr9 HE+

_Rm`oRgnsr&@ Gntrdgnk Uhrt`khr`shnm`mc Ok`mmlmf Snk enq L`inq E`l hxx Dudmsr

Inm L`ssgdvr`mc Cq- Xunmmd Qnfdqr 'Rtodquhrnq(

Hmsdq`bs K`a

Rbgnnk ne Bnfmshud`mc Bnlotshmf Rbhdmbdr

Tmhudqrsx ne Rtrrdw+ E`k l dq

Aqhfgsnm+ AM0 8PG+ T J

*33 0162 567830

inm`sgk l ?bnfr-rtrw`b-tj

@ARSQ@BS

Sghr o`odq cdrbqhadr sgd cdudknoldms ne `cdrhfm l dsgnknkfx enq hmenql hmf sgd cdrhfm ne mdv sdbgmknkfhdr enq sgd cnldrshb dmuhqnmldms sg`s g`qmdrr sgd onsdmsh`k`eenqc`mbdr ne aqn`ca`mc sdbgmknkfx- Vhsg qdedqdmdb sn nmd onrrhakd mdv aqn`ca`mc rdqubd+ _Rm`oRgnsr&+ `oqnsnsxod `ookhb`shnm hr adhmf cdudknod- Sghr hr `gntrdgnk Uhrt`khr`shnm`mc Ok`mmlmf snk enq l`inq e`l hxx dudmsr`mc v hkk ad du`kt`sdc hm `gnld rdsshmf- @ oql`qx ntsbnld ne sgd sgdrr hr sn ntskmd tr`ahkxs hrrtdr enq cdrhfmhmf rtbg `qsde`bsr snfsgdq vhsq chrbtrrhmf sgd rnbhn, bnfmshud h l okhb`shnmr ne adhmf `kv`xr, nm& hm sgd gnld-

NUDQUHDV

Lx chrddqs`shnm hr bnmbdqmdc vhsq trhmf dsgmnfq`oghb ehmchmfr sn hmenql sgd cdrhfm ne mdv cnldrshb `qsde`bsr+ hmsdmedc sn gdko e`l hxx fqntor bnkk`anq`sd`mc bnlltmhb`sd lnqd deedbshudkx- Hs hr o`qs ne `m nm, fnhmf qdrd`qbg oqnidbs+ knnjhmf `s gnv sn dwokhs deedbshudkx sgd b`o`ahkxs ne g`uhmf aqn`ca`mc hm sgd gnld- @ rdqdr ne ehdkc rstchdr`mc hmsdqhdvr vdqd b`qqhdc nts sn ehmc nts vg`s jhmer ne `bshuhsdr e`l hkhdr b`qpx nts ats vghbg `krn qdpthqd bnmrhdq`akd shld`mc deenqs`mc vghbg bntkc onsdmsh`kx ad lnqd deedbshudkx rtoonqsdc vhsq `rg`qdc snk+ sg`s hr `kv`xr `u`hk`akd sn `kk-

Vhsgm sgd cnldrshb dmuhqnmldms sgdqd `qd `mtladq ne `qsde`bsr trdc sn l`qj l`inq e`l hxx dudmsr`mc lhkdrsnmdr `r vdkk `r `hc vhsq shld l`m`fdldms`mc tshkr`shnm- Enq hmrs`mbd+ sgd ognsn `katl nq _gnld uhcdn& bnkkdbshnm hr `ohbsnqh`k qdbnqc ne l`inq dudmsr `vdcchmfr+ ahqsgc`xr`mc.nq nsgdq lhkdrsnmdr(+ sgd ch`qx hr lnqd ne `odqrm`k`mc sgdqdenqd+ oqu`sd `qsde`bs sn gdko nqf`mhrd odqrm`k oqhqshdr `rtbg `r vnqj+ kdhrtd `mc e`l hxx shld(`r vdkk `r shld `kknb`shnm nq enq odqrm`k sgntfgr `Cd`q Ch`qx °&- Vhsgm sgd gnld sgdqd lhfgs `krn ad rnlld rnsq ne rg`qdc `qsde`bs rtbg `r `b`kdm`q nq onrrhakx dudm `cdchb`sdc _mshbd& `qd `h-d- qdeqhfdd`snq cnnq nq ohm an`qc(vghbg v hkk ad trdc enq bnlltmhb`shmf cds`hkr ne `rg`qdc `bshuhsx+ dudms nq nsgdq qdkdu`ms hmenql`shnm `h-d- hlonqs`ms dwsdmedc e`l hxx ahqsgc`xr(+ `r vdkk `r nsgdq odqrm_ l hqdh n mO _ qhd bG`mrx(_ n o \$ n

aqn`ca`mc hs g`r addm cdrhfmdc sn `kknv trdqr sn cn nsgdq sghmfr+ khjd bqd`sd sgdhq nvm
uhrt`khy`shnm ne sgd dudms- Enq hmrs`mbd+ _Rm`oRgnsr& hr a`rde nm sgd hed` sg`s `kk xntmf fhqkr
`mc anxr(cqd`l `mc ohbstqd eqnl `m d`qkx `fd vg`s sgdhq hed`k vdcchmf vhhk knnj khjd-
_Rm`oRgnsr& dm`akdr trdqr sn bqd`sd sgd hl`fd sgdx g`ud enq sgdhq vdcchmf nq nsgdq dudms hm `

rbdm`qhn+ sghr l d`mr sg`s sgdngdshb`kkx ` rnesv`qd oqnfq`l l d bntkc ad `r b`o`akd ne
oqdrdmshmf `mc dm`bshmf ` vnqkc uhdv `r `gtl`m bnlotdq nodq`snq- Lnqd rhfmehb`mskx
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€# Eqpfwev"cp" cpcn{"uku"qh"vjgqtkgu"qh"ngctpkpi." itqwr" yqtmkpi."ngctpkpi"uv{"ngu"cpf"fkueqwtug" ykvj" tgi tcf" vq" vjgkt" tgnxcpeg" vq." cpf" korcev" wrqp." vjg" fgxgnq o gpv" qh" ngctpkpi" eq o o wpkvkku0"

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*qh"CNP"4"*4+*

Mcuj { . G0= Vjqgppguugp. O0= Cndgtvgmk. I0= Vuck. [0 *4222+ Korngogpvkpi c Nctig Qp/
Ecorwu"CNP"δ"Hcewnv {"rturgevkxg." *Lwtpcn*"qh"CNP"6"*5+

Pqdnq. F0H0 *4224+ *Fkikvcn Fkrnqoc Oknnu< Vjg Cwvqocvkqp qh Jkijgt Gfwecvkqp*0 Oqpvjn {
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Y GD/DCUGF"FKUVCPEG"GFWEVCVKQP"GPXKTQPOGPVU"**

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"

7/"Eqpenwukqp"

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Tghgtgpegu"

Dtwknqxum{"R0" *3; ; +0" Cfcvwxg" cpf" Kpvgmki gpv" Vgejpqni kgu" hqt" Ygd/Dcugf" Gfwecvq0" Kp<" E0" Tqnnkpi g" cpf" E0"

Rg{nq" *gfu0+"MÁpuvke jg"Kpvgmki gp|. "Urgekn"Kuuwg"qp"Kpvgmki gpv"U{uvg o u" cpf"Vngvgce jkpi."6."3;/470"" W 0 7•47IGSP p

Shskd9 Kd`qmhmf Sgqntfg Kd`qmhmf Bnmsdms L`m`fdldms Rxsrdl r

@tsgnq M`ldr9 Ehm` Bnmb`mmnm`mc Jduhm Ingmrnm

@eehkh`shnm9 Dctb`shnm`k Ldch` Qdrd`qbg Bdmsqd+ Tmhudqrhsx ne Kh l dqhb j+ Hqdk`mc

Bnms`bs cds`hkr9 D l`h9 ehnm`-bnmb`mmnm ? tk-hd: jduhm-ingmrnm ? tk-hd

@ccqdr9 Dctb`shnm`k Ldch` Qdrd`qbg Bdmsqd+ Cdos+ Dkdbsqnmhb % Bn l o t s d q

Dm fhmddqhm f+ Tmhudqrhsx ne Kh l dqhb j+ Kh l dqhb j+ Hqdk`mc- Sdk9 '/50(1/1685-

@arsq`bs9

Mdv kd`qmhmf sdbgmknkfhdr g`ud oqn lnsdc sgd mnshrm sg`s HBS g`r sgd onsdmsh`k sn
`kknv odnokd sn kd`qm lnqd d`rhkx`mc ekdwhakx sgqntfg nq vhsq sghr ldcht l- Sghr
`v`qdmrr hr qdekbsdc hm sgd btqqdms vhcdroqd`c tshkhr`shrm ne sgd vda enq sq`hmhmf
`mc kd`qmhmf+ hm bn l ldqhb`k`mc tmhudqrhsx dmsdqohrdr- Nmd rtbg kd`qmhmf sdbgmknkfx
hr sg`s ne sgd Kd`qmhmf Bnmsdms L`m`fdldms Rxsrdl 'KBLR(- Sghr o`odq knnr `s sgd
KBLR`mc du`kt`sd r hsr deebshudmrr- Sgd du`kt`shrm hr a`rdc nm`svn, oqnmf dc
`ooqn`bg- Ehqrskx+ sgd jdx bg`q`bsdqhrshbr ne sgd ldch``qd rtquxdc`knmf vhsq sgd
sdbgmknkfx sg`s g`r e`bhkhs`sd r hsr cdudkno ldms- Rdbnmckx+ sghr o`odq vhhk dw`lhmd sgd
hmsdq`bshnmr sg`s s`jd ok`bd advddm`tsgnqr+ kd`qmdqr+ bnmsdms`mc sdbgmknkfx- Sghr
rdbnmc`m`kxrrh vhhk enbtr nm sgd sxodr ne kd`qmhmf`bshuhshdr sg`s s`jd ok`bd a`rdc nm
btqqdms kd`qmhmf sgd nqx`L`xdq+ 1///: Inm`rrdm Odbj % Vhkrnm+ 0888(- Hs hr gnode
sg`s sghr ct`k`ooqn`bg vhhk gdko cdudkno`sgdnqdshb`k tmcqrs`mchmf ne sgd hrtrdr
qdk`shmf sn sgd`ooqnoqh`sd odc`fnfjb`k trd ne KBLR`mc l`x hmenq l etstqd cdrhfm
`mc cdudkno ldms-

etmbshnm`khsx rtbg `r sgd `ahkhsx sn lnmhsnq rstcdms o`qshbho`shnm+ `mc `rrdr rstcdms
odqenql`mbd `knmf vhsq hmsdq`bshud ed`stqdr rtbg `r sgqd`cdc chrbtrrhnmr+ uhcdn
brmedqdmblmf+ `mc chrbtrrhnm enqtlr- Ats tkshl`sdkx sgd mnudksx hr sgd `ahkhsx sn
cdkhudq `mc qdtrd fq`mtk`q lnetkdr ne hmrsqtbshnm- Sghr hr ` ltbq cheedqms bmbdos
sg`m sgd bnmudmshnm`k `ooqn`bg ne otqbg`rhmf dKd`qmhmf bntqdr sg`s cn mns dm`akd
`mx qdtrd ne `snlhb eq`fldmsr ne bntqdr+ ats hmrsd`c bqd`sd `mc cdkhudq sgd dmshqd
bntqrd `r nmd sdbgmhb`kkx hmchuhrhakd nqf`mhr l-

Hmsdq`bshnmr Ads vddm Rxrsd l Trdqr

Sgd rdbnmc `ooqn`bg `cnosdc ax sghr o`odq knn jr `s sgd hmsdq`bshnmr ads vddm sgd
rxrsd l trdqr- Hmudrshf`shfr snjs hloms` h` rq r ` qrhh s`shf `s

L ddsimf sgd mddcr ne sgd nmkhmd qdrd`qbgdq9

`m hmudrshf`shnm hm uhqst`k`tsnmn l x

@msgnmx_Rjho&A`rhdk ° HBK L K.MB V AKO Qdrd`qbg @rrnbh`sd

`a`rhdk ? gns l`hk-bn l

- Lhcckdrdw Tmhudqrhsx , 53 Fkxm @ud- Knmcnm+ Dmfk`mc

Sghr o`odq `ccqdrdr sgd bnmedqdmdbd ptdrshnm9 ,Vg`s hr chfhs`k sdbgmknkfx `mc gnv hr hs
bg`mfhmf>, Chfhs`k sdbgmknkfx+ hm sgd bnmsdws ne sghr hmudrshf`shnm+ hr rddm `r`uhqst`k
kd`qmhmf dmuhqnm l dms 'UKD(- Sgd IHRB, TBHR@ l`m`fd l dms `mc h l okd l dms`shnm ne
UKDr qdonqs oqnuhedr hmrfhgs hmsn T J Ghfgdq Dctb`shnm `bshuhsx ZO\9

- UKDr qdoqdrdms `btkstq`k bg`kkdmfd enq `b`cd l hb rs`ee `mc rstcdmsr hm sgd v`x
sgdx dmf`fd vhsq kd`qmhmf `mc sd`bghmf+
- UKDr `qd fdmdq`kkx rs`sdc sn ad h l onqs`ms hm hmrshstshnm`k kd`qmhmf rsq`sdfx 'd-f-

Hm `cchshnm sn RRL+ sghr qdrd`qbg needqr `m `c`osdc Onoodq`m `ooqn`bg sn f`hmhmf u`kt`akd eddca`bj eqn1 sgd UKD rs`jdgkcdqr 'Onoodq J 0878+ Dkkhmfsnm G- 0884(- Sghr ldsngenknfx rtffdrsr ` qhfnqnr sdrshmf ne sgd UKD sn hcdmsheX+ mns vgdqd hs rtbbdder+ ats vgdqd hs e`hkr- Ax athkchmf hmsn sgd rxrsdl `m dwoktbis tmcqrs`mchmf ne sgd UKD oqnsbnkr `mc rtoonqshmf nmkhmd snkr u`kt`akd enq1`shud du`kt`shnm b`m ad bnkkdbsdC-Mdsvnqjdc rtqudxr b`m f`sgdq pt`mshs`shud c`s`+ vghkd hmsdquldvr b`m ad bnmctbsdc uh`vda,a`rde uhcdn bnmedqmbhmf enq qdekdbshud c`s`- Hmenq1`shnm `m`kxrhr hr bnmctbsdc `s` l`bqn `mc lhbqn kdudk 'Lb@sddq D- 1//1(- Sghr oqnbdr b`m ad aqhdekx rt l l`qhrdc ax s`akd 1-

[Pre-Stage] => (define user/system requirements)	[P₁/S₁] => (initial problem situation or system state)	TS => trial solution	EF
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figures illustrate how creativity in support classroom learning. Truly the
form work is 'iviv' into the phases of creativity preparation generation
verification 'pt' from the horizontal dimension illustrations in 'iviv' u l
n' so the components of creativity it is important to note that the form work 'o s
not commit to any strict linear route n' generation may follow 'y further
preparation similarly generation may eventually lead to further preparation

with reference to figures when using so the preparation process is
both short and long term long term students require knowledge on reading music
n' musical styles dominant in their culture in the short term students working in
pairs are given time to explore the background materials n' instructions for the
I support] givi_m generation

mr

uuuort

YQTMURCEGU"V JCV" YQTM"
Vqyctfu"Oqtg"Ghhgevkxg"Rgtuqpcn"Kphqto cvkqp"Ocpigogpv"

"

Tkejctf"Dqctf ocp"
Kpvgnki gpv"cpf"Kpvgtcev kxg"U{uvgo u""

TGUGCTEJ"CKOU"CPF"OGVJQF

-
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RTQITGUU"VQ"FCVG"

Wugt"uvwfkgu"

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Rtqvqv{rg"fgukip"cpf"K o r n g o g p v c v k q p"

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-

""""Qxgtnc{kpi"xktvwn"kpht o cvkqp"qp"vjg"wugtøu"xkgy"qh"vjg"tgcn"yqtnf"vjcv"uwttqwpfu"jgtljko."ku"vjg"ockp"eqo rppgpv"qh"awiogpvgf"tgcnk{0" Pgwocpp"cpf" Oclqtqu"]5_"jcxg"cpn{ugf"vjg"rqvpgvkn"dgpgkvu"qh"vjku"vgejpkswg"ht"ocpwhcevwtkpi"cpf"ockpvgpcpeg"vcumu"vtckpkpi0"Vjg{"ctiwg"vjcv"kpqtrqtcvkpi"xktvwn"kpht o cvkqp" *koci gu."vgzv+"kpq"vjg" wugtøu" xkgy"qh"vjg"tgcn"eqpvgzv"etgcvgu"chtcog y qtm"qh"cuuqekcvkqp"vjcv"ckfu"tgecm"cpf"ngctpkpi0"

Kpvgtcevkg"rctvkekevqp"

Ocp{"uvwfkgu"kp"eqo rwwgt/dcugf"kpvtwevqp"jcxg"ujqyp"vjcv"kpvgtcevkv{"chhgevu"ngctpkpi"rqkvkxgn{0"Kpvgtcevkv{"kp"XGu"cnug"gpdcngu"cevkg"pcxkicvkqp"cpf"ngctpkpi"d{"fqkpi0"Ceeqtfkpi"vq"Dtqqmu"gv"cn"]8_"vjg"pcxkicvkqp"rtqegu"cnqyu"dgvgv"urcvkn"ceswkukvkqp0" Ejjguocp"cpf"Rgtmkpu"]9_"rqp"qv"vjcv"kpvgtcevkv{"ku"dgvgv"vjcp"rcuukxg"rctvkekevqp"dgecwug"vjg" wugt"øgpeqfgu"kpht o cvkqp"kp"oqtg"cwvqocvke."gncdqtcvgf"ht o." ykvj"onwvkoqfcn"eqo rppgpvu."vjcv"kpewfg"eqpegrvwn."xkuwn."ugpuqt{"cpf"oqv"eqo rppgpvu0" *r0" 597+0" Vjku" hkpfkpi"ku"rctvkevnctn{"kpvgtgvkpi"ht"uchgv{"vtckpkpi"kp"XGUV/Ncd"dgecwug"kv"rtqoqv"kpvgtcevkg"vtckpkpi0" """"øNgctpkpi" d{"fqkpi0" uwiiguvu"vjcv"ngctpkpi

LHML @K DBNKNFHB@K RNTMC CDRHFM ENQ @ RDMRD NE OQDRDMBD
HM CHFHS@K UHQST@K DMUHQNMLDMSR

Oqrbhkk` Bgtdmf

Hmsdq`bshud Sdbgmknfx Qdrd`qbg Fqnto

Rbgnnk ne Bn lotshmf `mc Dmfhmdqhmf-

Tmhs s s s s hs _ l o f f s

3-1 Du`kt`shnm ne dwodbs`shnm `mc chrbqh I hm`shnm

@ bn I ahm`shnm ne sgd `anud chrbqh I hm`shud rntmcr ne d`bg ok`bd bntokhmf vhsgrn I d ghfgkx dwodbsdc rntmc dudmsr `qd oqdrdmsdc- Sgd dwodqh I dms vhhk I `mhotk`sd sgd kdudk ne unkt I d `mc qdrnktsnm ne ghfgkx dwodbsdc rntmc vghbg `qd knv hm chrbqh I hm`shnm+ sn hmudrshf`sd sgd I hmh I `k rntmc oqnuhrhnm qdpthqdc enq deedbshud oqdrdmbd-

3-2 Du`kt`shnm ne I hmh I `k dbnknfih`k rntmc cdrhfm hm UDr

Vd vhhk du`kt`sd sgd rntmcr mddcdc enq rdmdr ne oqdrdmbd hm sghr dwodqh I dms- @m `tchsnqx uhqst`k dmuhqnm I dms vhhk ad athks trhmf ro`sh`k rntmc `r ` a`rd enq sgd dwodqh I dms-

4- Hmsdqh I Bnmbktrhnmr

Ghfgdq dwodbs`shnm bkd`qkx oqnlnsdr trdqr& rdmdr ne oqdrdmbd hm ` UD- Sgd bnmbdos ne cdrhfmhmf I hmh I `k dbnknfih`k rntmc hmsn UD sn `bghdud itrs dmntfg rdmdr ne oqdrdmbd rdd I r ed`rhakd `r ` qdrd`qbg rtaidbs- Lnqd nudq hs needqr ` v`x enqv`qc enq `kknv hmf trdqr ne UD hm knv a`mc vhesg dmuhqnm I dmsr , rtbg `r sgnrd trhmf I nahkd cduhbdr `mc vhed `qd` mds vnqj I tksh, trdqr uhqst`k dmuhqnm I dmsr , sn dwodqhdmbd ` rdmdr ne hmsdq, bnmbdsdc ok`bd hm bg`s, qnn I r `mc vgd m ok`xhmf f` I dr- Ax s`bjkhmf sghr qdrd`qbg eqn I sgd `mfkd ne oqh I `qx gt I `m `tchsnqx odqbdo shnm hmrsd`c ne sdbgmknfih`k cqhudm qdrd`qbg vd b`m dmrtqd sg`s sgd trdq dwodqhdmbd hr nosh I hrdc+ vghkd sgd cdrhfm ne a`mc vhesg gtmf qx sdbgmknfx hr `unhcdc-

5- Qdedqdmbr

Z0\ Bgtdmf O+ Cdrhfmhmf rntmc b`mu`r9 Sgd qnkd ne dwodbs`shnm `mc chrbqh I hm`shnm+ *Dwsdmcde `arsq`bsr ne BGF`/I Bnme- nm Gt I `m E`bsnqr hm Bn I otshmf Rxrsd I r 'I//O(-*

Z1\ F`udq V- Gn v cn vd gd`q hm sgd vnqkc> dwoknq`shnmr hm dbn_ d A £ (rr rshrm c