IsiCwangciso-nkqubo seMathematika sika-2015 – 2019

Isiqulatho

IziFinyezo

AMESA	Association for Mathematics Education of South Africa
ANA	Annual National Assessment
CAPS	Curriculum and Assessment Policy Statement
CM	Circuit Manager
CTLI	Cape Teaching and Leadership Institute
DBE	Department of Basic Education
DIP	District Improvement Plan
FAT	Formal Assessment Task
FET	Further Education and Training
FP	Foundation Phase
GET	General Education and Training
HEI	Higher Education Institution
HoD	Head of Department
IP	Intermediate Phase
LITNUM	Literacy and Numeracy
LoLT	Language of Learning and Teaching
LTSM	Learning and Teaching Support Material
NCS	National Senior Certificate
NGO	Non-governmental Organisation
PLC	Professional Learning Community
SA	Subject Adviser
SBA	School-based Assessment
SGB	School Governing Body
SIP	School Improvement Plan
SMT	Senior Management Team
SP	Senior Phase
WCED	Western Cape Education Department

IsiCwangciso-nkqubo seMathematika seminyaka emiHlanu seSebe iWCED (2015 – 2019)

1 > Intshayelelo

IMathematika sisifundo esinyanzelekileyo kwizikolo zaseMzantsi Afrika ukuya kutsho kwiBanga le-9. Bonke abafundi beBanga le-10 ukuya kwele-12 kufuneka bakhethe phakathi kweMathematika neLitheresi yeMathematika. Phambi kwango-2006 uninzi lwabafundi bala mabanga bebekhetha ukungathathi naluphi uhlobo lweMathematika.

Iintlobo ezahlukeneyo zokuhlola zehlabathi zinike ubungqina bokungaqhubi kakuhle kwabafundi kwiMathematika eMzantsi Afrika.

Kuthathelwa ingqalelo olu lwazi, esi sicwangciso-nkqubo semathematika sephondo sijonge ukufezekisa oku kulandelayo:

- Ukuphucula umgangatho wokufundiswa kweMathematika kuzo zonke izikolo
- Ukuphucula ukufundwa kwemathematika ngabo bonke abafundi
- Ukuphucula umgangatho wokuphunyelelwa kwesi sifundo
- Ukunyuswa kwenani labafundi abakhetha baze baphumelele iMathematika kwiBanga le-10 ukuya kwele-12.

IGrafu yoku-1 apha ngezantsi ibonisa inkqubo yeBanga le-12 kwiMathematika ngokwekhowudi yempumelelo. Lithathela ingqalelo ezi ziphumo, iSebe iWCED liza kusebenzisa iindlela ezintathu ukukhangela inkqubela, ndlela ezo zizezi, umyinge wabafundi (ipesenti yabafundi):

1) Abaphumelela iMathematika kwiSatifikethi sikaZwelonke seMatrikhi
2) Abanempumelelo engaphezu kuka-60%, kunye
3) Nabanempumelelo engaphezu kuka-80%.
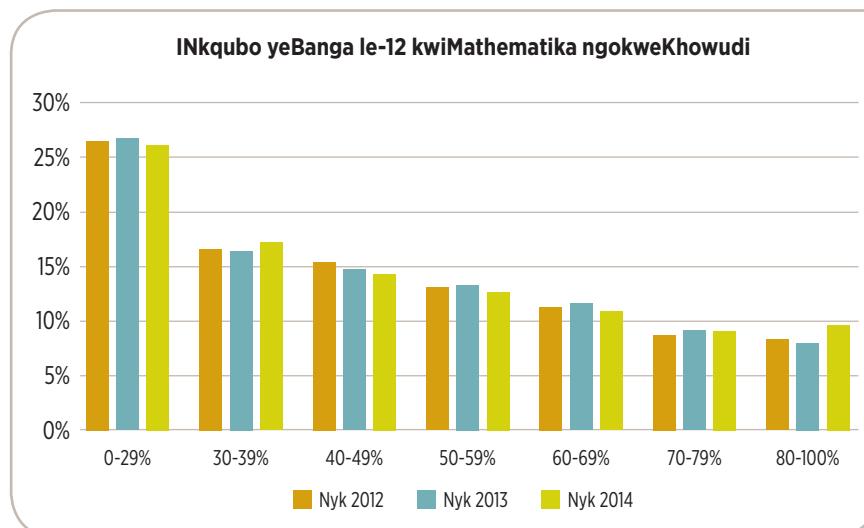
IGrafu yoku-1: Inkqubo yeBanga le-12 kwiMathematika ngokwekhowudi yempumelelo.

2 ›IMbangi yesi siCwangciso-nkqubo

Izalathisi ezahlukeneyo zibonisa ubuthathaka kwinkqubo zikwaggamisa amathuba okuphucula umgangatho wemfundo yemathematika kweli phondo. Ziquka iziphumo zebanga ngalinye, ukuHlola koNyaka kukaZwelonke, iimvavanyo zenkqubo yeSebe (systemic tests) iWCED.

2.1 Izinga lokuphumelela leMathematika eNtshona Koloni ngo-2014

IGrafu yesi-2 ithelekisa amazinga okuphumelela ango-2014 kwiklasi nganye. Abonisa ukuhla okuthe chu kwinkqubo yeBanga loku-1 ukuya kwele-12.

IZinga lokuPhumelela lango-2014 kwiMathematiki yeBanga ngalinye

	Bng 1	Bng 2	Bng 3	Bng 4	Bng 5	Bng 6	Bng 7	Bng 8	Bng 9	Bng 10	Bng 11	Bng 12
Nyk 2014	89.0%	87.8%	84.3%	80.0%	81.4%	82.2%	87.3%	68.5%	56.2%	60.0%	70.0%	72.8%
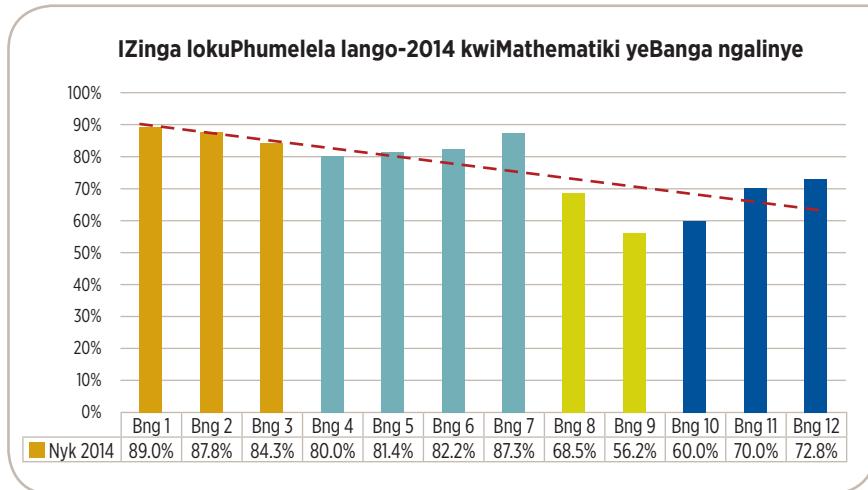
IGrafu yesi-2: Amazinga okuphumelela isifundo seMathematika eNtshona Koloni KwiBanga loku-1-12 ngo-2014 ("ukuphumelela" kuxa ufumene ngaphezu kwe-40% kwiBanga loku-1-9 ize ibe ngu-30% kwiBanga le-10-12). Umthombo wolwazi: ISebe iWCED iCandelo: loLawulo lokuHlola.

Isiphelo soku kwehla kwesantya sokuphumelela singabonwa kwizinga lokuthatha inxaxheba kwiMathematika eliyi-32.8% ngo-2014 kwiBanga le-12.

2.2 Ukuhlola koNyaka kukaZwelonke kwiMathematika: IBanga loku-1 – IBanga lesi-6 neBanga le-9

Iziphumo zeANA zibonisa ukuhla okuqhubekayo kwenkqubo ephantsi kwiMathematika ukususela ngo-2012 ukuya ngo-2014 (jonga iTheyibhile yoku-1). Zibonisa imfuneko eqhubekayo yenkxaso, ungenelelo kunye nokubekwa esweni okujoliswe kwiBanga R ukuya kwele-9.

IBanga	I-% ePhakathi Amanqaku	I-% ePhakathi Amanqaku	I-% ePhakathi Amanqaku	I-% Yempumelelo eyamkelekileyo (> 50 %)
	2012	2013	2014	2014
1	70.1	61.1	71.9	85.1
2	62.1	62.2	63	74.7
3	47.4	57.4	60.5	72.6
4	45.6	42.2	41.9	35.6
5	39.4	39.7	45.2	42.3
6	32.7	44.9	50.9	50.9
9	16.7	17	13	6.2

ITheyibhile yoku-1: IMathematika yeANA ka-2012-2014 (iziphumo zaseNtshona Koloni, zidluliselwe ukusuka kwinkgxelo yeANA ka-2014)

IiANA azikaniki ziphumo ezinokuthelekiswa ngokungqingqwa kunyaka ngonyaka. Noko kunjalo, zenza ukuba siziqonde ezona nkalo zeengxaki eziphambili, nesisingatha zona ngesi sicwangciso-nkqubo. Ezi ngxaki ziquka ezi zilandelayo:
- Isigama neepropati zeMathematika

- I-aljibra esisiseko
- Izakhono zokusombulula iingxaki zokubala, ngakumbi kwijiyometri nakwiiaplikheyishini ezibala izithuba phakathi kwezinto (spatial applications)
- Inkqubo yabafundi beBanga le-9, apho abafundi bakhetha phakathi kweMathematika neLitheresi yeMathematika kwisigaba seFET.

2.3 Ukuhlolwa kwenkqubo kweephondo kwiMathematika kwiSebe iWCED

ITheyibhile yesi-2 apha ngezantsi ibonisa iziphumo zokuhlolwa kwenkqubo konyaka kwiSebe iWCED kwiMathematika yebanga lesi-3, 6 nele-9 kwithuba leminyaka emihlanu, ukususela ngo-2010 ukuya ku-2014.

ISebe iWCED libeke umyinge wokuphumelela oku-50% ngokunxulumene nolu vavanyo.

Iziphumo zibonisa ukuphucula okuya kukhula kancinci, kodwa hayi ngesantya esinokufezekisa injongo yephondo yokuqinisekisa ukuba i-40% yabafundi beBanga le-12 bakhetha iMathematika ngo-2019.

Ibanga 3	I-% yeBng Abak-wa-3 abapasi-leyo	I-% epha-kathi yeBng 3	Ibanga 6	I-% yeBng Abak-wa-9 abapasi-leyo	I-% epha-kathi yeBng 6	Ibanga 9	I-% yeBng Abak-wa-9 abapasi-leyo	I-% epha-kathi yeBng 9
2010	(48,3)	(48,0)	2010	(24,4)	(39,2)	2010	9,4	24,4
2011	47,2	46,3	2011	23,4	37,6	2011	10,4	24,9
2012	51,5	48,9	2012	26,4	39,5	2012	13,9	29,3
2013	55,0	51,1	2013	28,3	39,3	2013	14,3	28,7
2014	54,0	52,0	2014	30,4	41,4	2014	14,9	28,7

ITheyibhile yesi-2: Iziphumo ezisisishwankathelo zokuhlolwa kwenkqubo yeSebe iWCED kwiMathematika: 2010 – 2014 Amanqaku okuphumelela ngu-50% Ithathwe: kwingxelo yeSebe iWCED efumaneke ngowe-11 kuDIsemba ka-2014 (WCED report obtained 11 Dec 2014)

Ezi ziphumo zibonisa ukwehla kwe-15% kwinkqubo ukusuka kwiBanga lesi-3 ukuya kwiBanga le-9. Sisebenzisa esi salathisi xa sibeka ujoliso lwempumelelo yeBanga le-9 ukwenzela ukuqinisekisa ngokuthatha inxaxheba okwandileyo xa sebekwiBanga le-12.

2.4 I-TIMSS

Uphando lweTIMSS lunceda ekuhloleni indlela oqhuba ngayo uMantsi-Afrika xa uthelekiswa namazinga asisiseko ehlabathi. Lukwabonisa indlela abaqhuba ngayo abona bafundi bethu babalaseleyo xa bethelekiswa nabo behlabathi.

Abafundi be-9 babhale uvavanyo lweTIMMS ngo-2011. Abafundi baseMzantsi Afrika baphucule indlela abaqhuba ngayo kweli nqanaba xa bethelekiswa nango-2002, kodwa basekwizinga eliphantsi kwiziphumo zehlabathi (jonga iGraphu yesi-3).

UMzantsi Afrika ufumene amanqaku angama-352 kwinqanaba leBanga le-9 ngo-2011 xa kuthelekiswa nangama-285 ango-2002. Abona bafundi babalaseleyo baseMzantsi Afrika baye basondela kwizinga eliphakathi lendlela aqhube ngayo awona mazwe abalaseleyo.
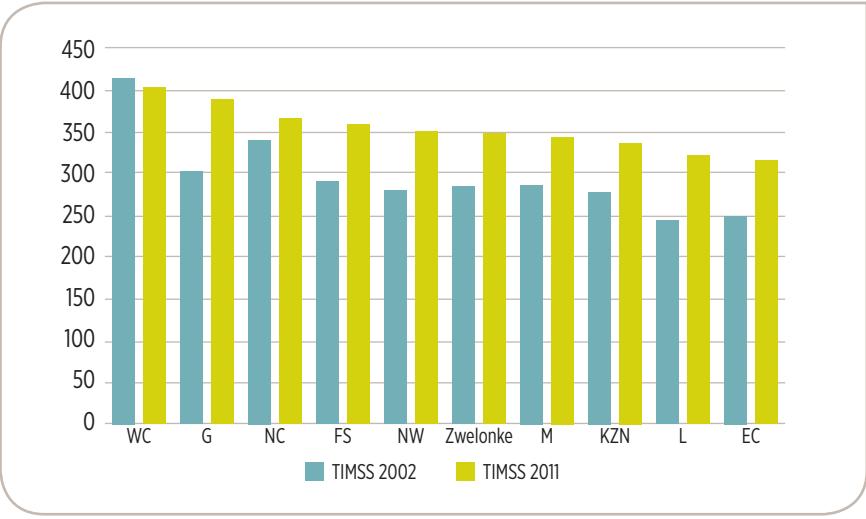
IGrafu yesi-3: Utshintsho kwimpumelelo yephondo phakathi kuka-2000 no-2011

2.5   ISatifikethi sikaZwelonke seMatrikhi (2007-2014)

IGrafu yesi-3 ibonisa inani elipheleleyo labafundi ababhaliswe kwiBanga ngalinye leFET
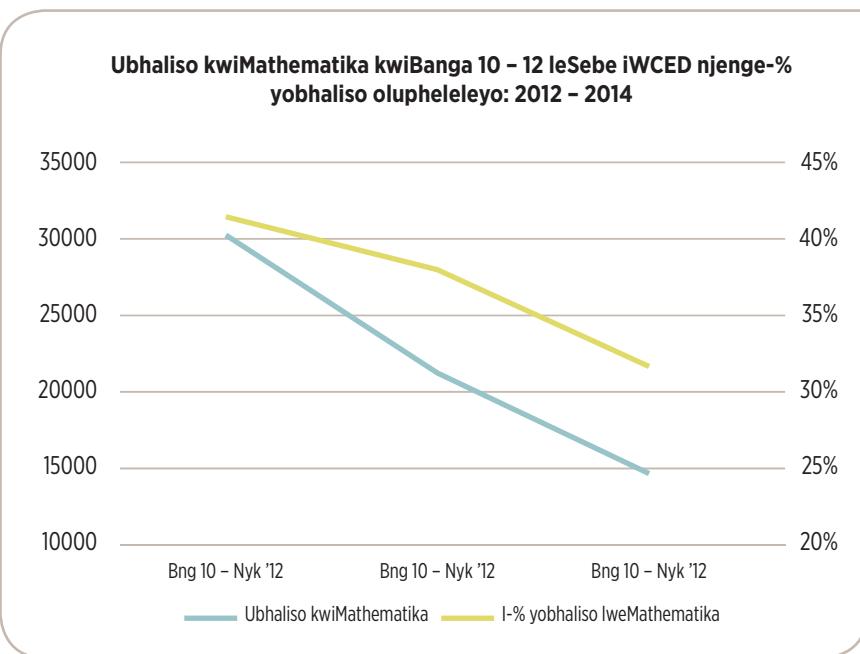
IGrafu yesi-3: Ubhaliso kwiMathematika kwiBanga 10–12 leSebe iWCED njenge-% yobhaliso olupheleleyo: 2012 – 2014.

Inani labafundi abakhetha iMathematika kwiBanga le-12 lehle ngama-6 000 ngonyaka eNtshona Koloni phakathi konyaka ka-2012 no-2014 nanjengoko abafundi abaninzi bekhethe iMathematika Litheresi.

Inani labafundi ababhalisele iMathematika ngo-2014 lehle ngama-15 252 xa lithelekiswa nokubhaliselwa kwesi sifundo kwiBanga le-10 ngo-2012.

Esi sicwangciso-nkqubo sephondo, ngoko ke, sijonge ekuphuculeni umgangatho wokufunda nokufundisa iMathematika kuwo onke amabanga, ukwenzela ukwandisa amanani okuphumelela kunye nokuphucula umgangatho weziphumo.

> " Isicwangciso-nkqubo seMathematika sikwajonge ukunyusa inani labafundi abakhetha baze baphumelele iMathematika kwiBanga le-10 – 12 "

3 >IsiNdululo sesi siCwangciso-nkqubo

Esi siCwangciso-nkqubo seMathematika sijonge ukuncedisana nokufundwa kweMathematika okusemgangathweni ophezulu. Esi sicwangciso-nkqubo sigxile ekudibaniseni iidayimenshini ezine zokusebenzela nokuzinzisa ukufundwa nokufundiswa okusemgangathweni kweMathematika. Ezo dayimanshini zezi (Jonga kulo mzobo ungezantsi):

3.1 **Ukuphuhliswa kwabantu**
(ukutyala kwiiarhente ezibandakanyekayo)

3.2 **Iindlela zokufundisa ezisebenzayo**
(ukusebenzisa izingcwangciso-nkqubo zokufundisa ezisebenzayo eziya kukhokelela ekufundeni)

3.3 **Ukunikwa nokusetyenziswa kwezixhobo/kwezakhiwo**
(ukufunyanwa nokusetyenziswa kakuhle kwezixhobo)

3.4 **Ukubekwa esweni nokuhlolwa**
(ukuqwalaselwa (nokuziqwalasela) okuqhubelekayo okwenzelwa ukugqamisa impumelelo).

[Iiarhente]
Ukuphuhliswa kwabantu

- Ukuqeqeshwa kootitshala
- Amaqela ootitshala/amagosa axhasana ngezakhono
- Ukukhankaselwa kwabasebenzi, ukungeniswa emsebenzini nokugcinwa kwabo besemsebenzini
- Ukuzithemba kwabafundi, icala elilandelwa ngabafundi kunye nokuzilawula kakuhle kwabafundi
- Ukubandakanyeka kwabazali
- Ubambiswano lokwenza okuthile

[Inkqubo]
Ukusetyenziswa kweeNdlela zokuFundisa EziSebenzayo

- Ukugxila kumgangatho wengqiqo
- Ulwimi eklasini yeMathematika
- Ukuhlolela ukuncedisana nokufunda nokufundisa
- Ulawulo olusemgangathweni lweklasi
- Ukutolikwa ngendlela komgaqo-nkqubo

[Ukucamngca]
Monitoring and Evaluation (UQwalaselo nokuHlola)

- Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba lesikolo
- Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba lesithili
- Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba likandlunkulu
- Ukukhuthazwa kokubaluleka kwesi sicwangciso-nkqubo kunye nesifundo

[Ubume]
Izixhobo / Izakhiwo Ukunikwa okuSetyenziswa kwazo

- Ukufumana izakhiwo / izixhobo ezifanelekileyo
- Ukusetyenziswa ngokukuko kwezixhobo
- Ukusetyenziswa kokufunda okusebenzisa i-intanethi (ie-learning) ukunzulisa ulwazi nokuqonda

Umzobo 1: Iidayimenshini nemiba yesiCwangciso-nkqubo soLwimi seSebe iWCED (2015-2019)

Kukho ukusebenzisana okuqhubekayo phakathi kweedayimenshini ezahlukeneyo zesicwangciso-nkqubo njengokuba ootitshala nezikolo besebenzela ukufundisa okungcono. Kodwa ke, ugxininiso olubekwa kwidayimenshini nganye okanye indibanisela yazo lusenokutshintsha ngenxa yeemeko neemfuno zezikolo njengokuba kukhangelwa ezona ziphumo zokufunda zibalaseleyo. Idayimenshini nganye inemiba engundoqo ebalulekileyo ekuphuculeni inkqubo yokufundisa neyabafundi kwiMathematika. Nangona zonke ezi dayimenshini ziza kusingathwa kwisigaba ngasinye, isigaba sokukhula komfundi, ngokunjalo nemeko yekharityhulam nesikolo zizo eziza kubonisa ugxininiso.

Iqela elikhulu lophando, elithetha malunga neenyani malunga nokunikwa kwezinto zokufundisa eNtshona Koloni, lilo eliye laxhobisa esi sicwangciso-nkqubo. Kukho ukuvumelana okuphangaleleyo malunga nokuba ukufundisa okusemgangathweni ophezulu kungancediswa ngeendlela zokufundisa "ezifanelekileyo".

Esi sicwangciso-nkqubo sisekelwe kwizimvo ezivela kuphando malunga neendlela zokufundisa ezisebenzayo, phando olo lugqamisa iindlela zokuqhutywa kokufundisa kunye neenkqubo zokuzilungiselela ezisetyenziswa ngootitshala, yaye lukwabonisa ukuba ezi zinto zinomahluko eziwenzayo ekufundeni izifundo nentlalo kwabo bonke abafundi (jonga isiHlomelo A).

Uphando lukwancedise ekuchongeni iimpawu ezinefuthe elibonakalayo nelinentsingiselo ekufundeni kwabafundi – hayi nje ifuthe elakhayo. Olu phando lukwasincedise nasekuqondeni ukuba zeziphi izenzo zokufundisa ezenze umahluko omkhulu, ngelixa lukwabonisa ukuba ngubani oyena unoxanduva ngezi zenzo (jonga kwisiHlomelo B).

Eli candelo lilandelayo licacisa imiba echongiweyo kuyo nganye kwezi dayimenshini zine zesicwangciso-nkqubo seMathematika seSebe iWCED. Kunikwa izikhokelo nemimiselo ephangaleleyo. Kuza kuphuhliswa iinkcukacha ngokuya siqhuba esi sicwangciso-nkqubo kwiziCwangciso zoPhuculo zesiThili nakwiziCwangciso zoPhuculo zeziKolo zale minyaka mihlanu izayo..

> " **Nangona zonke ezi dayimenshini ziza kusingathwa kwisigaba ngasinye, isigaba sokukhula komfundi ngokunjalo nemeko yekharityhulam nesikolo zizo eziza kubonisa ugxininiso.** "
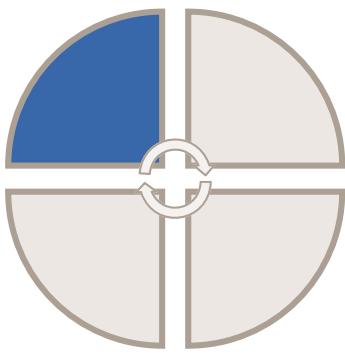
4 > **IiNkcukacha** zesi siCwangciso-nkquboy

4.1 Ukuphuhliswa kwabantu

Esi siCwangciso-nkqubo seMathematika sikhuthaza uqeqesho lwabo bonke abachaphazeleka ekufundisweni kweMathematika kweli phondo: ootitshala, amagosa ezemfundo, abafundi, abazali, iiHEI kunye nabanye ababambisani besi sifundo abafanelekileyo.

a) Uqeqesho lweetitshala namagosa ezemfundo

- Ukuqhutywa kokukhangelwa kwezakhono nokusekwa kwedathabheyisi yezakhono zootitshala beMathematika ukwenzela ukufumanisa iimfuno zabo zoqeqesho.
- Ukuphuculwa kolwazi lomxholo weMathematika kunye nolwazi lomxholo weendlela zokufundisa kwinkalo zomxholo ezingundoqo.
- Ukunikwa kokuqondwa okunzulu kokuqhubeka kwekharityhulam kunye nenkqubela phambili kumabanga nezigaba zonke.
- Ukuphuhliswa kokukwazi kootitshala ukuhambelanisa iinjongo zokufunda, ukufundisa kunye nokuhlola.
- Ukuxhasa ukuveliswa kwezicwangciso zokufundisa ezinakho ukwenzeka.
- Ukuphucula izakhono zokufundisa ukwenzela ukunceda abafundi bafumane iinkqubo zemathematika kunye nezinye izakhono, umz. ukusebenzisa iBODMAS, ukusombulula iingxaki zokubala, njalo njalo.
- Ukuqeqeshwa kootitshala kunye nenye inkxaso enxulumene noko ukwenzela ukusingatha iimfuno ezahlukeneyo zabafundi nezootitshala.
- Ukuhlumisa ubunkokeli nolawulo olusebenzayo kwikharityhulam ngokuqinisekisa ukuba iiHoD nootitshala abakhokela isifundo seMathematika zithatha inxaxheba ekomelezeni iiforam zokubagcina benolwazi ngokuqhubekayo kuphuhliso lwesifundo.
- Ukuqinisekisa ukuba ootitshala abasuka kwizikolo ezichongiweyo bathatha inxaxheba kwiinkqubo zoqeqesho oluthile lweMathematika ngokwebanga ukwenzela ukuphucula indlela abaqhuba ngayo abafundi.
- Ukunika inkxaso yasesikolweni yokufundisa okwahlukeneyo.
- Ukuhlumisa ubunkokeli nolawulo olusebenzayo kwikharityhulam ngokukhuthaza iiHoD nootitshala abakhokela isifundo seMathematika kwinqanaba lesikolo ukuba baye kwiiforam zokomeleza zeMathematika.

b) Amaqela ootitshala/amagosa axhasana ngezakhono (iiProfessional Learning Community – iiPLC)

- Ukukhokela iiSA, iiSMT, nootitshala abakhokela izifundo ukuba baqale, bancedise baze basebenzise iiPLC ezikolweni naphakathi kwezikolo ukwenzela ukukhuthaza ukwabelana ngezona ndlela zisebenzayo kwanokusebenza ngokubambisana.
- Ukusebenzisa iiPLC ukuzinzisa uphuhliso lootitshala kunye nokwenza ukuba izikolo zisebenza kunye ukunika bonke abafundi eyona mfundo inokufumaneka.
- Ukuqhuba iiseshoni zomsebenzi wamaqela (cluster work) ukwenzela ukuhlalutya imisantsa yokufundisa echongwe ekuhloleni okwenziwa esikolweni kunye novavanyo lwenkqubo kwanokuyilwa kwamaphulo okungenelela okusingatha loo misantsa.
- Ukuthathela ingqalelo nokunika iamaqithi-qithi ootitshala abakhokela izifundo/abalungiseleli beePCL.
- Ukukhuthaza ukuyiwa kweekhosi ezimfutshane (umz. ezinikw yiCTLI, naziimanyano zootitshala, iiyunivesithi, njalo njalo) ukwenzela ukuxhasa, ukukhumbuza nokomeleza indlela yokufundisa.

Uphuhliso lwabantu

a) **Ukuqeqeshwa kootitshala**
b) **Amaqela ootitshala/ amagosa axhasana ngezakhono**
c) **Ukukhankaselwa kwabasebenzi, ukungeniswa emsebenzini nokugcinwa kwabo besemsebenzini**
d) **Ukuzithemba kwabafundi, icala elilandelwa ngabafundi kunye nokuzilawula kakuhle kwabafundi**
e) **Ukubandakanyeka kwabazali**
f) **Ubambiswano lokwenza okuthile**

c) Ukukhankaselwa kwabasebenzi, ukufakwa kwabo emsebenzini kunye neendlela zokubagcina besemsebenzini

- Ukuqhuba umsebenzi omandla wokukhankaswa kweetitshala ezinezakhono zemathematika kwiiHEI nakwezinye iindawo
- Ukubuyekeza abafundi ababonakalisa izakhono ukuba bakhethe ukutitsha
- Ukunika amaqithi-qithi ukwenzela ukugcina oottitshala abanemveliso nabanezakhono.
- Ukukhuthaza ukuqeshwa kweetitshala ezizingcali nezikwaziyo ukufundisa iMathematika.
- Ukunika amaqithi-qithi kootitshala abakhokelalayo kunye neentloko zezifundo/iiHOD ezibonisa ukuthembisa ngokuba ziinkokeli ezizizo zingekabi nathuba lininzi zisenza loo msebenzi.
- Ukuyilwa kwenkqubo yokungeniswa emsebenzini (induction) (yiCTLI) kootitshala abatsha ukwenzela ukuqhuba ezona ndlela zisebenzayo zokufundisa kunye nokuphuhlisa izakhono zokufundisa iMathematika.
- Ukunika uqeqesho olufanelekileyo kuzo zonke iititshala neeHoD ezintsha ukwenzela ukuqiniseksia ukuba bayakwazi ukuyiqhuba ngempumelelo iCAPS.

d) Ukuzithemba kwabafundi, icala elilandelwa ngabafundi kunye nokuzilawula kakuhle kwabafundi

- Ukuxhasa abafundi ekukhuleni kokuzithemba kwabo. Ukuze oku kwenzeke, abafundi badinga ukukhokelwa okucacileyo nokuzinzileyo okuvela kootitshala ukuze bakwazi ukuthatha uxanduva kunye nokuthatha amanyathelo afanelekileyo okusingatha ubuthathaka.
- Ukuseka imeko eqhelekileyo yeklasi eqinisekisa ukuba abafundi bayakonwabela ukufunda yaye bayakuqonda ukuba kubalulekile ukufunda kwabo.
- Abafundi bayawenza umsebenzi wasekhaya yaye ngabo abaphala phambili ekufundeni kwabo bekwafumanisa ukuba impumelelo idinga ukuzincama nokusebenza nzima.
- Ukukhuthaza ukufundisa okuncedisa abafundi ukuba banxulumanise ulwazi lwabo nolo lwazi basuka nalo emakhaya, ukunxulumanisa ulwazi olutsha kunye nelizwe elingaphaya kwegumbi lokufundela ukwenzela ukubeka ulwazi kwimida nangaphaya kwemida yesifundo.

e) Ukubandakanyeka kwabazali

- Ukwazisa malunga nesi sicwangciso-nkqubo seMathematika seSebe iWCED njengesicwangciso sophuculo.
- Ukuqhuba iindlela ezifanelekileyo zokuqinisekisa ngenkxaso yabazali noluntu ekufundweni nasekufundisweni kweMathematika.
- Ukuxoxa nabazali malunga nezakhono zokulungiselela ezidingekayo ekuphuculeni nasekugcineni izakhono zabantwana babo kwimathematika.
- Ukukhuthaza abazali ukuba baxhase iithagethi zesikolo kunye nezicwangciso-nkqubo zokuncedisa abantwana emakhaya.
- Ukuqondisa abazali ukuba into abayilindele emntwaneni inefuthe elibalulekileyo kwimpumelelo yomntwana.
- Ukunxibelelana nabazali malunga nenkqubela yomfundi rhoqo ngekota.
- Ukuququzelela imicimbi yeMathematika yosapho apho abazali nootitshala bazibandakanya kwimisebenzi esekelwe kwimathematika efana neephazili, imibuzo (ii-quiz), imidlalo yeMathematika, njalo njalo.

f) Ubambiswano lokwenza okuthile

- Ukubambisana nezenzo ezenziwa ziiNGO, iiHEI namacandelo abucala apho kunikwa oottitshala inkxaso yasesikolweni.
- Ukunika amaphulo ongenelelo axhasa izithili nezikolo ekubekeni nasekufezekiseni iithagethi zazo ngendlela exelwe kwiiDIP neeSIP.
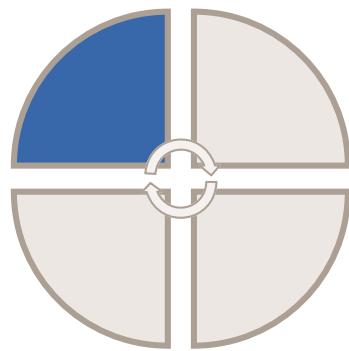
Uphuhliso lwabantu

a) **Ukuqeqeshwa kootitshala**

b) **Amaqela ootitshala/ amagosa axhasana ngezakhono**

c) **Ukukhankaselwa kwabasebenzi, ukungeniswa emsebenzini nokugcinwa kwabo besemsebenzini**

d) **Ukuzithemba kwabafundi, icala elilandelwa ngabafundi kunye nokuzilawula kakuhle kwabafundi**

e) **Ukubandakanyeka kwabazali**

f) **Ubambiswano lokwenza okuthile**
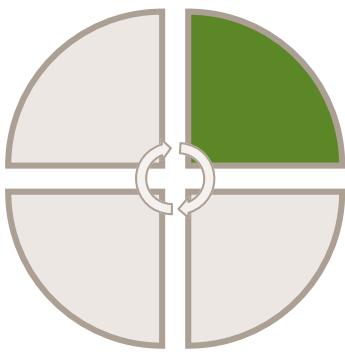
Ukusetyenziswa kweendlela zokufundisa ezisebenzayo

a) **Ukugxila kumgangatho wengqiqo**
b) **Ulwimi eklasini yeMathematika**
c) **Ukuhlolela ukuncedisana nokufunda nokufundisa**
d) **Ulawulo olusemgangathweni lweklasi**
e) **Ukutolikwa ngendlela komgaqo-nkqubo**

4.2 Ukusetyenziswa kweendlela zokufundisa ezisebenzayo

Iindlela zokufundisa ezisebenzayo zibhekisa kwiindlela zokufunda nokufundisa ezixhasa impumelelo yomfundi ephucukileyo. Esi sicwangciso-nkqubo sikhuthaza iindlela zokufundisa ezisebenzayo ekufundisweni kweMathematika ngokugxininisa umgangatho wengqiqo, ukubaluleka kolwimi eklasini yeMathematika, ukuhlolwa kokufunda (learning), ukudala imeko yeeklasi ezisemgangathweni kunye nokufundwa (reading) nokucaciswa kakuhle kwemigaqo-nkqubo yemfundo.

a) Ukugxila kumgangatho wengqiqo

- Ukuphuhlisa ulwazi nokuqondwa okunzulu kwemixholo.
- Ukuyila, ukubonisa nokuqhuba iinkqubo ezilungiselelweyo zeMathematika engasebenzisi zixhobo (Mental Mathematics).
- Ukusebenzisa imibuzo nemizekelo ehlupheza uluhlu lwamazinga engqiqo.
- Ukuqinisekisa ukuba imisebenzi yokuhlola ifuna ukusetyenziswa kwamazinga engqiqo ohlukeneyo.
- Ukufundisa kufuneka kubandakanye iincoko ezakhayo malunga nemiba nemixholo yeMathematika kwanokuba zibancedisa njani abafundi ekuqondeni nasekulungiseleleni ngcono ilizwe labo.

b) Ulwimi eklasini yeMathematika

- Ulwimi sisixhobo esiyimfuneko ekuveliseni nasekudluliseni intsingiselo.
- Ukusebenzisa isigama seMathematika esichanekileyo xa kufundwa iincoko.
- Abo bafundi ulwimi iLoLT yesikolo ingelolwimi lwabo lwasekhaya, banike inkxaso eyongezeleleyo yaloo LoLT kuwo onke amanqanaba.
- Ukuhlalutya idatha yokuhlola ukwenzela ukujonga iingxaki zolwimi nokucwangcisela ungenelelo oluyimfuneko.
- Ukukhuthaza iincoko eziphakathi kootitshala nabafundi neziquka imiba nezimvo ezibalulekileyo ezichaphazelekayo kwiMathematika.
- Ukudibanisa uze usebenzise idathabheyisi yokukhangela inkqubo yabafundi iLoLT engelolwimi lwabo.

c) Ukuhlolela ukuncedisana nokufunda nokufundisa

- Ukuyila uze uqhube ukuhlola okusisiseko okulungiselelayo kwabafundi kwibanga elitsha.
- Ukuhlola makwenzelwe ukukhuthaza ukufunda.
- Ukuyila imisebenzi yokuhlola enika ulwazi olufanelekileyo malunga nempumelelo yokufunda nokufundisa.
- Ukusebenzisa imisetyenzana eyimizekelo yokuhlola xa uyila imisetyenzana yakho eyimpendulo yeemfuno zikatitshana nabafundi.
- Ukunika abafundi ingxelo ekhawulezileyo kunye neempendulo ezijonge ekuvaleni umsantsa ophakathi kweyona mpumelelo yabafundi kunye nempumelelo efunekayo.
- Ukusetyenziswa kobungqina obuvela ekuhloleni ukuyila izicwangciso zokuphucula inkxaso enikwa abafundi.
- Ukunyuswa kwenani lezikolo ezithatha inxaxheba kwimiNgeni, amaKhuphiswano neeOlimpiyadi zeMathematika.

d) Ulawulo olusemgangathweni lweklasi

- Ukudala imeko yeklasi eyamkelayo, exhasayo, ekhuthazayo negxile ekufundeni ukuze abafundi bakwazi ukukufezekisa ngokupheleleyo oko banamandla okukwenza.
- Abafundi bahloniphane, basebenze ngabanye, ngababini nangamaqela ukuphuhlisa ukuqonda okungcono kunye nokuthatha uxanduva ngemfundo yabo neyabanye abafundi.
- Ukudala iklasi yeMathematika enobutyebi bezixhobo ezixhasa ukufunda nokufundisa ngempumelelo.
- Ukuphembelela ukuqeqesheka kunye nokufundisa ngomzekelo.
- Iindibano zokufunda nokufundisa kufuneka zibe nocwangco yaye zicwangciseke kakuhle.

e) Ukutolikwa komgaqo-nkqubo

- Iinqununu, iiHoD, ootitshala batolike ngokuchanekileyo ikharityhulam yeMathematika ebekiweyo ngokweemfuno zokufundisa nokuhlola ngokunjalo nangokufakwa kwayo kwisicwangciso samaxesha okufundisa (i-time-table).
- Ootitshala bakuqonde ukuqhubeka nenkqubela-phambili yemixholo/izakhono ukusuka kwisigaba esithile ukuya kwesinye kwanendlela ukufundiswa nokukhunjuzwa kwabafundi ngomxholo/izakhono kwisigaba esithile okwenza ngayo isiseko sokufundwa kwemathematika kwisigaba esilandelayo.
- Ixesha lokufundisa elibekelwe imathematika.

4.3   Ukunikwa nokusetyenziswa kwezixhobo/kwezakhiwo

Ukufundiswa ngempumelelo kweMathematika kufuna ukuba ukuchongwa nokusetyenziswa konxulumaniso kwezixhobo ezikhoyo kunye nokusetyenziswa kwezakhiwo ukunzulisa nokunabisa ulwazi lweMathematika.

a)   Ukufumana izakhiwo / izixhobo ezifanelekileyo

- Izikolo kufuneka zenze ukuhlolwa okusisieko kweeasethi zize zimana zithenga iincwadi zabafundi (iitekstbhukhu) izincedisi zokuqondwa kwemiba yemathematiki ezifanele abafundi bebanga ngalinye kunye neekiti zokubonisa zeMathematika zootitshala.
- Ukuqinisekisa ukuba ukuhanjiswa kwezixhobo ezincedisa ekufundweni kuyafikelela kubo bonke abafundi.
- Ukugcina iirejista zeeasethi ukwenzela ukubeka esweni ukusetyenziswa nokugcinwa kwezixhobo yaye kusetyenziswe iimali ezabiweyo kunye nezinye iindlela ukuncedisana nokufumana izixhobo/izakhiwo ezifunekayo ukuquhuba iSIP kwiMathematika.

b)   Ukusetyenziswa ngokukuko kwezixhobo

- Ootitshala basebenzise izixhobo neemathiriyeli ezifanele ukufunda nokufundisa kwesigaba.
- Amaqela eklasta alungiselele kwangoko kwikota nganye ukuze abone izixhobo ezifunekayo ekufundiseni, njalo njalo.
- Ukwabelana ngezimvo malunga nokusetyenziswa ngempumelelo kwezixhobo ezifumanekayo ukwenzela ukunceda ekufundiseni imiba ephambili kwiMathematika.
- Ukukhuthaza ukubambisana kwezikolo ukuyila nokwabelana ngezixhobo nezakhiwo.

c)   Ukusetyenziswa kokufunda okusebenzisa i-intanethi (ie-learning) ukunzulisa ulwazi nokuqonda

- Ootitshala basebenzise iikhompyutha ukukhetha imithombo yokufundisa ekwiintanethi.
- Ukuxhasa ootitshala ekukhetheni izixhobo zokufunda okusebenzisa i-intanethi (e-learning resources) ukwenzela ukunzulisa ulwazi nokuqonda kwabafundi imixholo nezakhono.
- Ukuphononga nokucebisa malunga neesoftwe ze-e-learning kunye nezixhobo zedijithali ezixhasa ukufunda okwahlukeneyo (differentiated learning).
- Ukufakwa kweemathiriyeli ezifanelekileyo kwiseva yeSebe iWCED.
- Ukuqinisekisa ukuba abazali bayazazi ezi zixhobo ukwenzela ukuba bakwazi ukuncedisa nokuxhasa ukufikeleleka kweMathematika.
- Ukusetyenziswa kweePLC ukuyila idathabheyisi yokufundisa, ukuhlola nezixhobo zokufundisa ezisekelwe kwiwebhusayithi ezilungiselelwe umxholo ngamnye.
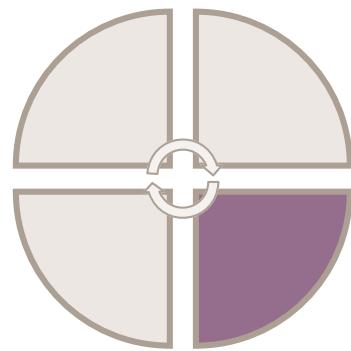
Ukunikwa nokusetyenziswa kwezixhobo/ kwezakhiwo

a) Ukufumana izixhobo/ izakhiwo ezifanelekileyo

b) Ukusetyenziswa kwezixhobo ngendlela efanelekileyo

c) Ukusetyenziswa kwe-e-learning ukunzulisa ulwazi nokuqonda
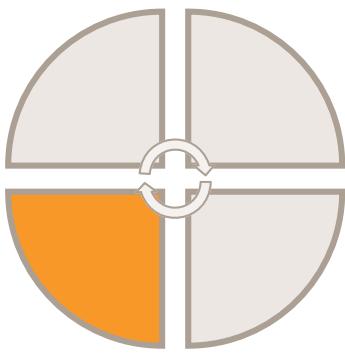
Ukubeka esweni nokuHlola

a) **Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba lesikolo**

b) **Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba lesithili**

c) **Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba likandlunkulu**

d) **Ukukhuthazwa kokubaluleka kwesi sicwangciso-nkqubo kunye nesi sifundo**

4.4 Ukubekwa esweni nokuHlolwa

Ukuphuculwa kokufundisa okuya kuzinzisa ukufundwa nokufundiswa kweMathematika kuxhomekeke ekubeni kumana kujongwa kulungiswa iindlela zokufundisa kumanqanaba ohlukeneyo esistim yezemfundo. Oku kujonga nokulungisa kufuneka kucebise utshintsho kwisiCwangciso-nkqubo seMathematika kwanendlela esiya kusazisa ngayo ebantwini.

a) *Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba lesikolo*
- Isikolo ngasinye masenze isicwangciso sophuculo lwemathematika esiqhutywa ziithagethi nesibandakanya izimvo zabo bonke abasebenzi.
- Kubekwe esweni ukufunda nokufundisa ngokulandelela inkqubela nokulungisa izicwangciso.
- Kuhlolwe ukusebenza kunye nefuthe lokuhlola ngokubeka esweni ukufundiswa kwekharityhulam kunye nendlela ekuqhutywa ngayo kwiSBA ezikolweni..
- Kuhlolwe inkqubo yabafundi kwimiSetyenzana yokuHlolwa okuseSikweni.
- Kuphononongwe ukusebenza kolawulo lweeLTSM.
- Ukuqhubeka nokuphucula indlela ekuqhutywa ngayo kwiMathematika ngokuthi kulungiswe iSBA yasesikolweni ngokwedatha efunyenwe kukuhlolwa kwenkqubo kukazwelonke nokwephondo.
- Izikolo kufuneka zilandele umgaqo-nkqubo wokumodareyitha kwasesikolweni zize ziqhubeke nokuwuphucula zithathela ingqalelo uphuhliso lwesifundo kunye neendlela ezingcono zokufundisa.
- Ii-SMT kufuneka zixhase intloko yesifundo/iHoD ekulawuleni iqela lesifundo ngokuqinisekisa uixesha lokufundisa lisetyenziswa ngokufanelekileyo, ngokumodareyithwa kokuhlola kunye noxanduva lokusingatha izinto ezingenzekanga kakuhle.
- Ukuphucula izakhono zokulawula nokubeka esweni ezinazo iiSMT.

b) *Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba lesithili*
- Ukuqinisekisa ngokuqeshwa kwabantu abafanelekileyo ukwenzela ukomeleza inkxaso yesithili.
- Ukukhangelwa nokuphuhliswa kwamagosa ezithili ajongene neMathematika.
- Ukuhlolwa kokugqitywa kwekharityhulam, ifuthe nesantya sokuqhutywa kwayo ngokuhambelana namazinga asisiseko abekwe nguzwelonke.
- Ukumodareyithwa kwezicwangciso zokufundisa kunye neeLTSM ukwenzela ukukhangela ukuba imisantsa iyasingathwa na.
- Izithili kufuneka zenze isiCwangciso sokuPhucula iMathematika kwiiDIP zazo ukwenzela ukuba zinike ingxelo kwizitraktrsha zephondo nezikazwelonke.
- Izithili kufuneka (1) zibeke esweni ukulandelwa kwekharityhulam ngokunjalo nokusetyenziswa kwexesha lesikolo; (2) ziqinisekise ukuba isikolo ngasinye sinomgaqo-nkqubo wokuhlola nokumodareyitha; (3) zimodareyithe ziqinisekise iSB; (4) zibeke esweni ukusetyenziswa nokugcinwa kakuhle kwezixhobo, kuquka neencwadi zabafundi.
- Iingcali ziqhube iiwekshophu zokuxhasa amagosa nootitshala ekufezekiseni iziphumo ezifunekayo..

c) *Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba likaNdlunkulu*
- Ukuphuhlisa izakhono zokulawula nokubeka esweni zawo onke amagosa okufundiswa kolwimi akundlunkulu.
- Ukuphandwa kweziphumo zeemvavanyo ezisetwe ngaphandle ukwenzela ukuncedisana neendlela zokuxhasa ootitshala kunye nezicwangciso zophuculo zasesikolweni nezezithili.
- Ukufuthela ukuyilwa kweekhosi zophuhliso nobunkokeli beetitshala ukwenzela ukuphuhlisa ubunkokeli nolawulo lwekharityhulam olufezekisa iinjongo ezibekiweyo.
- Ukuquka ukubekwa esweni nokuxhaswa ngeekhosi zokungeniswa emsebenzini (induction) yiCTLT kuzo zonke izithuba zolawulo nobunkokeli.
- Ukuphononga esi sicwangciso-nkqubo rhoqo ngonyaka ukwenzela ukuqinisekisa ukuba iithagethi zesicwangciso-nkqubo sangaphambili ziyafezekiswa, kuze apho kuyimfuneko kwenziwe ulungiso oluya kuqinisekisa ngokuqhutywa kwaso ngokuyimpumelelo.

d) *Ukukhuthazwa kwesi sifundo kunye nesi sicwangciso-nkqubo*
- Ukuhlola ukuqondwa kokuqhutywa kwesiCwangciso-nkqubo seMathematika sePhondo zizithili, izikolo kunye neendawo zoluntu.
- Ukuqinisekisa ukuba bonke abafanele ukuthatha inxaxheba bayakuqonda ukubaluleka kwesi sicwangciso-nkqubo.
- Ukuxhasa utshintsho kwisicwangciso-nkqubo esicwangcisiweyo, apho kuyimfuneko.
- Ukukhuthaza ukubaluleka kokukwazi ukubala nokukwazi ukukhetha ukuba neMathematika njengenxalenye yezifundo ezikhethwa ngumfundi kwiBanga le-10.

5 ▶ Ukucaciswa kwesi siCwangciso-nkqubo ngokwesiGaba ngasinye

Imiba yedayimenshini nganye yesigaba ngasinye kufuneka ifundwe nesicwangciso-nkqubo gabalala esiphantsi kwecandelo lesi-4. Qaphela ukuba kwimeko yesiGaba esiPhakathi iBanga lesi-4 ukuya kwelesi-7 (isikolo saseprayimari) kunye nesiGaba esiPhezulu iBanga 8 nele-9 (isikolo esiphakamileyo) la mabanga abekwe kunye ngokwendlela ekunokukwazeka ngayo ukwenziwa izinto.

5.1 IBanga R – 3

5.1.1 Ukuphuhliswa kwabantu

a) *Uqeqesho lweetitshala namagosa ezemfundo*

Ukuphuculwa kolwazi lomxholo weMathematika kunye nolwazi lomxholo weendlela zokufundisa kwinkalo zomxholo ezingundoqo. Ukuqonda indlela abantwana abancinci abayiqonda ngayo imixholo yemathematika. Ukuqonda ukubaluleka kwendlela yokufundisa ngokudlala kwiBanga R. Ukwakha ukuqondwa ngcono kokuqhubeleka kwekharityhulam kunye nenkqubela ukusuka kwiBanga R ukuya kwelesi-4 kunye nokuqinisekisa ngohambelwano phakathi kweenjongo zokufunda, ukufundisa nokuhlola. Ukuxhasa ukuveliswa kwezicwangciso zokufundisa ezinakho ukwenzeka. Ukuqhutywa koqeqesho lootitshala olukhatshwa luphando oluthatha inxaxheba, ukubekwa esweni kunye nenkxaso yasesikolweni. Ukunika inkxaso yasesikolweni yokufundisa okwahlukeneyo. Ukuqhutywa kokuhlolwa kwezakhono zokufundisa zootitshala bemathematika. Ukuyila idathabheyisi yezakhono zootitshala kubekwa phambili ukuya ezikhosini kunye nokuphelisa uqeqesho olungeyomfuneko. Ukubandakanya inkxaso yesifundo semathematika kulo lonke uqeqesho lobunkokeli bekharityhulam. Ukuqinisekisa ukuba abaCebisi beziFundo zaseFP kunye nooHOD baseFP baxhotyiselwa ukubeka esweni nokuxhasa kwiMathematika ukususela kwiBanga R ukuya kwelesi-3.

b) *Amaqela ootitshala/amagosa axhasana ngezakhono (iiProfessional Learning Community – iiPLC)*

Ukuqalisa nokukhulisa iiPLC zibe ngoovimba bolwimi ukwenzela ukuphucula ukwabelana ngezona ndlela zingcono zokwenza kunye nokusebenzisana. Ukusebenzisa iiPLC ukuzinzisa uphuhliso lootitshala kunye nokwenza ukuba izikolo zisebenza kunye ukunika bonke abafundi okona kufundwa nokufundiswa kwemathematika kunokufumaneka. Ukuhlalutya imisantsa yokufundisa echongwe kwiSBA kunye novavanyo lwenkqubo kwanokuyilwa kwamaphulo okungenelela okusingatha loo misantsa. Ukuthathela ingqalelo nokunika iamaqithi-qithi ootitshala abakhokela izifundo/abalungiseleli beePCL ukuze bancedise (mentor) oogxa babo. Ukukhuthaza ukuyikwa kweekhosi ezimfutshane ukwenzela ukuxhasa, ukulungisa ngokutsha kunye nokomeleza izenzo zokufundisa.

c) *Ukukhankaselwa kwabasebenzi, ukufakwa kwabo emsebenzini kunye neendlela zokubagcina besemsebenzini*

Ukuqhuba ukhankaso olukhulu lootitshala beFP abanolwazi olunzulu lwemathematika. Ukukhuthaza ukuqeshwa nokusetyenziswa kootitshala beFP abayaziyo imathematika. Ukunika amaqithi-qithi iinkokeli zotitshala zemathematika yaseFP, iintloko zezifundo okanye iiHoD. Ukuyila inkqubo yokungeniswa emsebenzini (induction) kootitshala abatsha baseFP ukwenzela ukuba baqhube ezona ndlela zingcono zokufundisa iMathematika kwanokuqinisekisa ukuba banezakhono ezaneleyo zokuqhuba iCAPS.

d) *Ukuzithemba kwabafundi, icala elilandelwa ngabafundi kunye nokuzilawula kakuhle kwabafundi*

Ukuxhasa abafundi ukuba bakhule ukuzithemba nokuzimisela ukuzibandakanya kwimathematika. Ukuseka imeko eqhelekileyo yeklasi eqinisekisa ukuba abafundi bayakonwabela ukufunda imathematika yaye bayakuqonda ukuba kubalulekile ukufunda kwabo. Ukukhuthaza ukufundisa okuncedisa abafundi ukuba banxulumanise ulwazi lwabo olutsha lwemathematika kunye nolo lwazi sele benalo besuka nalo emakhaya, kananjalo nokunxulumanisa ulwazi olutsha kunye nelizwe lemathematika elingaphaya kwegumbi lokufundela nakuzo zonke izifundo.

e) *Ukubandakanyeka kwabazali*

Ukwazisa malunga nesi sicwangciso-nkqubo seMathematika seSebe iWCED njengesicwangciso sophuculo. Ukuqhuba iindlela ezifanelekileyo zokuqinisekisa ngenkxaso yabazali noluntu ukwenzela ukubonisa ukubaluleka kweMathematika yaseFP. Ukunika abafundi incwadana ethi "Wamkelekile kwiBanga loku-1", ncwadana leyo icacisa izakhono ezidingekayo ekuphuculeni nasekuzinziseni ulwazi lwabantwana babo kwimathematika. Ukukhuthaza abazali ukuba baxhase iithagethi zesikolo yaye babancedise abafundi emakhaya kumsebenzi wasekhaya wemathematika. Ukuqondisa abazali ukuba into abayilindele emntwaneni inefuthe elibalulekileyo kwimpumelelo yomntwana.

f) *Ubambiswano lokwenza okuthile*

Ukubambisana nezenzo ezigxile kwiMathematika ezenziwa ziiNGO, iiHEI namacandelo abucala apho

kunikwa ootitshala inkxaso yasesikolweni kwimathematika. Ukunika amaphulo ongenelelo axhasa izithili nezikolo ekubekeni nasekufezekiseni iithagethi zazo ezifanelekileyo zeMathematika ngendlela exelwe kwiiDIP neeSIP. Ukuqinisekisa ukuba onke amaphulo ongenelelo anomgaqo-sikhokelo wethiyori (theoretical framework) yaye akhatshwa yindlela yokubeka esweni nokuhlola.

5.1.2 Ukusetyenziswa kweendlela zokufundisa ezisebenzayo

a) Ukugxila kumgangatho wengqiqo

Nangona ugxininiso lwaseFP lusekunkqayeni nasekwazini imixholo engundoqo, kufuneka kwenziwe zonke iinzame zokuphuhlisa ulwazi olunzulu nokuqondwa kwemixholo. Ukusetyenziswa kwendlela elungelelanisayo kwimathematika, nequka umyalelo ongqalileyo, ukukhangela, ukuphanda nokusombulula iingxaki. Ukuqondwa nokusetyenziswa kweendlela ezisebenzisa izinto eziphathayo, ukuxutywa kokusetyenziswa kwezinto eziphathwayo neziqikelelwayo kunye nezo zisebenzisa izinto eziqikelelwayo kumanqanaba afanelekileyo kunye nokwakha izakhono zokucinga ngengqiqo. Ukuyila, ukubonisa nokuqhuba iinkqubo ezilungiselelwayo zeMathematika engasebenzisi zixhobo (Mental Mathematics). Ukwenza izicwangciso zezifundo ezisebenzisa indlela elandela inkqubo ethile ukwenzela ukukhulisa nokwakhela phezu kwezakhono ezikwiCAPS ezinobunzima obuya bukhula. Ukusebenzisa iCAPS ukuseka eyona migangatho isezantsi yemathematika, inkqubo nenkqubela yabafundi. Imisebenzi yokuhlola kwesi sigaba kufuneka ixananazele kumazinga engqiqo ohlukeneyo.

b) Ulwimi eklasini yeMathematika

Ukusetyenziswa kolwimi lwemathematika njengexhobo esiyimfuneko ekuveliseni nasekudluliseni intsingiselo yemathematika. Ukukhuthaza iincoko eziphakathi kootitshala nabafundi ezinentsingiselo neziquka imiba nezimvo ezibalulekileyo ezichaphazelekayo kwiMathematika. Ukusebenzisa isigama seMathematika esichanekileyo xa kufundwa iincoko. Ukuqhutywa iindlela ezisingatha ulwimi lweMathematika.

c) Ukuhlolela ukuncedisana nokufunda nokufundisa

Ukuyila nokuqhuba ukuhlolwa okusisiseko kwezakhono ezilungiselelayo kuwo onke amabanga. Ukugxininisa ukuhlola okulungiselela ukufundisa. Ukuyila imisebenzi yokuhlola enika ulwazi olufanelekileyo malunga nempumelelo yokufunda nokufundisa. Ukusebenzisa imisetyenzana eyimizekelo yokuhlola xa uyila imisetyenzana yakho eyimpendulo yeemfuno zikatitshana nabafundi. Ukunika abafundi ingxelo ekhawulezileyo kunye neempendulo ezijonge ekuvaleni umsantsa ophakathi kweyona mpumelelo yabafundi kunye nempumelelo efunekayo. Ukusetyenziswa kokuhlola ukuyila izicwangciso zokuphucula inkxaso enikwa abafundi.

d) Imeko esemgangathweni yegumbi lokufundela

Ukudala imeko yeklasi ebamkelayo bonke abafundi, exhasayo, ekhuthazayo negxile ekufundeni ukuze abafundi bakwazi ukukufezekisa ngokupheleleyo oko banamandla okukwenza. Ukuphembelela ukuqeqesheka kunye nokufundisa ngomzekelo. Ukudala iklasi yeMathematika enobutyebi bezixhobo ezixhasa ukufunda nokufundisa ngempumelelo. Ukucwangcisela ukufunda okuqhubelekayo (systematic learning) okwenziwa ngendlela ezolileyo nelungiselelwe kakuhle.

e) Ukutolikwa ngendlela komgaqo-nkqubo

Ukuqinisekisa ukuba iinqununu, ooHoD kunye nootitshala bayitolika ngokuchanekileyo ikharityhulam yeCAPS yeMathematika ngokumayela neemfuno zokufundisa nokuhlola, ngokunjalo nokufakwa kwayo kwisicwangciso samaxesha okufundisa. Ukuqinisekisa ukuba iMathematika yesiGaba esisisiSeko yabelwa ize isetyenziselwe ixesha elifanelekileyo lokufunda nokufundisa. Ukuxhasa ootitshala ekuqondeni ukuqhubela phambili nenkqubela yolwazi/izakhono ezingundoqo zemathematika kwesi sigaba nakwezilandelayo, kugxininiswa kwindlela ukufundiswa nokunxulunyaniswa kwalo mxholo nezi zakhono zimiselweyo okwenza ngayo isiseko sokufundiswa kwemathematika kwisiGaba esiPhakathi.

5.1.3 Ukunikwa nokusetyenziswa kwezixhobo/ kwezakhiwo

a) Ukufumana izakhiwo / izixhobo ezifanelekileyo

Ukuphononongwa kwazo zonke izixhobo zokuxhasa ukufunda nokufundiswa kwemathematika. Ukuqinisekisa ukuba iincwadi zabafundi (iitekstbhukhu) zeMathematika, izixhobo zabafundi ezicacisa imixholo yemathematika (manipulatives) ezifanele ibanga elo, iikiti zokubonisa zootitshala ziyabandakanywa kwisiCwangciso soPhuculo seSikolo seMathematika. Ibhajethi yokuthengwa koluhlu olubanzi lwezixhobo zokuncedisa ekubaleni kunye nezixhobo ezisemgangathweni ezixhasa ukufunda nokufundiswa kwemathematika yaseFP. Ukuqinisekisa ngokuncediswa kwezixhobo okuya kusenyukela. Ukusiwa kwezixhobo zokuxhasa abafundi, kuquka iincwadi zokusebenzela zabafundi (workbooks) zeSebe iDBE, kubo bonke abafundi. Ukugcina iirejista zeeasethi ukwenzela ukubeka esweni ukusetyenziswa nokugcinwa kwezixhobo.

b) *Ukusetyenziswa ngokukuko kwezixhobo*

Ukwenza ukuba ootitshala bafumane ithuba lokusebenzisa ngokufanelekileyo izixhobo neemathiriyeli zokufunda nokufundisa. Ukuqinisekisa ukuba ootitshala baseFP bazilungiselela kwangoko izixhobo ezidingekayo ekufundiseni kwikota nganye. Ukusebenzisa iiPLC ukwabelana malunga nokusetyenziswa ngempumelelo kwezixhobo ezifumanekayo ukwenzela ukunceda ekufundiseni imiba ephambili kwiMathematika yaseFP.

c) *Ukusetyenziswa kokufunda okusebenzisa i-intanethi (ie-learning) ukunzulisa ulwazi nokuqonda*

Ukuqinisekisa ukuba bonke ootitshala bayaphuhliseka ekukwazini ukusebenzisa iikhompyutha kwanokuchonga imithombo yokufundisa ekwiIntanethi. Ukuxhasa ootitshala ekukhetheni izixhobo zokufunda okusebenzisa i-intanethi (e-learning resources) ukwenzela ukunzulisa ulwazi nokuqonda kwabafundi imixholo nezakhono. Ukuphononga nokucebisa malunga neesoftwe ze-e-learning kunye nezixhobo zedijithali ezixhasa ukufunda okwahlukeneyo (differentiated learning). Ukufakwa kweemathiriyeli ezifanelekileyo kwiseva yeSebe iWCED. Ukuqinisekisa ukuba abazali bayaziswa malunga nezi zixhobo. Ukusetyenziswa kweePLC ukuyila idathabheyisi yokufundisa, ukuhlola nezixhobo zokufundisa ezisekelwe kwiwebhusayithi ezilungiselelwe umxholo ngamnye waseFP.

5.1.4 Ukubekwa esweni nokuHlolwa

a) *Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba lesikolo*

Ukuyila isicwangciso sasesikolweni sophuculo lweMathematika esiqhutywa ziithagethi nesibandakanya bonke ootitshala baseFP. Ukubekwa esweni kokufunda nokufundisa ngokulandelela inkqubela nokulungisa izicwangciso. Ukuhlolwa kokusebenza kunye nefuthe lokuhlola ngokubeka esweni ukufundiswa kwekharityhulam kunye nendlela ekuqhutywa ngayo kwiSBA ezikolweni.. Ukuqhuba nokuphucula indlela ekuqhutywa ngayo kwiMathematika ngokuthi kulungiswe ukuhlola kwasesikolweni okusetwa esikolweni ngokwedatha efunyenwe kukuhlolwa kwenkqubo kukazwelonke nokwephondo. Izikolo kufuneka zilandele umgaqo-nkqubo wokumodareyitha kwasesikolweni zize ziwuhlenga-hlengise zithathela ingqalelo uphuhliso lwesifundo kunye neendlela ezingcono zokufundisa. Ii-SMT kufuneka zixhase intloko yesifundo/iHoD yaseFP ekulawuleni iqela lesifundo laseFP ngokuqinisekisa ngokusetyenziswa ngokukuko kwexesha, ngokumodareyithwa kokuhlola kunye noxanduva lokusingatha izinto ezingenzekanga kakuhle. Ukwabelana ngezona ndlela zokusebenza ziyimpumelelo ngokunxulumene nokubekwa esweni kwenkqubo yokumodareyitha kuwo onke amanqanaba kwisisitim yesikolo ukwenzela ukulandela inkqubela eyenziwa ekufundiseni, ekuhloleni nasekufundeni. Ukuphuhlisa izakhono zokulawulwa nokubeka esweni ezinazo iiSMT.

b) *Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba lesithili*

Ukuphuhlisa izakhono zokulawula nokubeka esweni zawo onke amagosa ezithili. Ukuhlolwakokugqitywa kwekharityhulam, ifuthe nesantya sokuqhutywa kwayo ngokuhambelana namazinga asisiseko abekwe nguzwelonke. Ukuqinisekisa ukuba zonke izikolo zilandela umgaqo-nkqubo wokumodareyitha wangaphakathi esikolweni. Ukumodareyitha izicwangciso zokufundisa, umsebenzi wabafundi kunye nokuhlola. Ukuyila isiCwangciso sokuPhuculwa kweMathematika sesithili nesihambelanisa iinjongo neethagethi zephondo. Ukunika iingxelo zenkqubo ezeziwa rhoqo.

c) *Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba likaNdlunkulu*

Ukuphuhlisa izakhono zokulawula nokubeka esweni zawo onke amagosa akwandlunkulu. Ukuphandwa kweziphumo zeemvavanyo ezisetwe ngaphandle ukwenzela ukuncedisana neendlela zokuxhasa ootitshala kunye nezicwangciso zophuculo zasesikolweni nezezithili. Ukufuthela ukuyilwa kweekhosi zophuhliso nobunkokeli bootitshala ukwenzela ukuphuhlisa ubunkokeli nolawulo lwekharityhulam olufezekisa iinjongo ezibekiweyo. Ukubandakanya ukubekwa esweni kweMathematika kwiikhosi zokungeniswa emsebenzini (induction) zaseCTLI ezenzelwa abalawuli baseFP neenqununu ezifikayo. Ukuphononga esi sicwangciso-nkqubo seMathematika rhoqo ngonyaka ukwenzela ukuqinisekisa ukuba iithagethi zesicwangciso-nkqubo ziyafezekiswa, kuze apho kuyimfuneko kwenziwe uhlenga-hlengiso oluya kuqinisekisa ngokuqhutywa kwaso ngokuyimpumelelo.

d) *Ukukhuthazwa kwesi sifundo kunye nesi sicwangciso-nkqubo*

Ukuhlola ukuqondwa kokuqhutywa kwesi sicwangciso-nkqubo seMathematika sePhondo zizithili, izikolo kunye neendawo zoluntu. Ukuqinisekisa ukuba bonke abafanele ukuthatha inxaxheba bayakuqonda ukubaluleka kwesi sicwangciso-nkqubo. Ukuxhasa utshintsho kwisicwangciso-nkqubo esicwangcisiweyo, apho kuyimfuneko.

5.2 IBanga 4 – 7

5.2.1 Ukuphuhliswa kwabantu

a) Uqeqesho lweetitshala namagosa ezemfundo

Ukuphucula ulwazi lomxholo wesifundo seMathematika kunye nolwazi lomxholo weendlela zokufundisa kugxininiswa kakhulu kwimiba ephambili yeMathematika kunye nendlela yokufundisa efanelekileyo. Ukunikwa kokuqondwa okunzulu kokuqhubeka kwekharityhulam kunye nenkqubela phambili kumaBanga neziGaba zonke. Ukuqinisekisa ngokuhambelana phakathi kweenjongo zokufunda, ukufundisa nokuhlola. Ukuxhasa ukuyilwa kwezicwangciso zokufundisa ezifanelekileyo ngokwemeko nezithathela ingqalelo izibeki-mgangatho (pace setters) zeMathematika. Ukuqeqeshwa kootitshala nokunikwa kwenye inkxaso enxulumene noko ukwenzela ukusingatha iimfuno ezahlukeneyo zabafundi nezootitshala. Ukuseka idathabheyisi yezakhono zootitshala ekufundiseni iMathematika kwesi sigaba.

b) Amaqela ootitshala/amagosa axhasana ngezakhono (iiProfessional Learning Community - iiPLC)

Ukukhokela ooSA, iiSMT kunye nootitshala abakhokela izifundo ukuba baqale, bancedise baze basebenzise iiPLC ezikolweni naphakathi kwezikolo ukwenzela ukukhuthaza ukwabelana ngezona ndlela zisebenzayo kwanokusebenza ngokubambisana. Ukusebenzisa iiPLC ukuzinzisa uphuhliso lootitshala kunye nokwenza ukuba izikolo zisebenzisane ekunikeni bonke abafundi okona kufundiswa kweMathematika kunokufumaneka. Ukuqhuba iiseshoni zokusebenza zeePLC apho kuya kujongwa imisantsa yokufundisa efunyenwe kwiSBA kunye novavanyo lwenkqubo kwanokuyilwa kwamaphulo okungenelela okusingatha loo misantsa iboniweyo. Ukukhuthaza ukuba kuyiwe kwiinkomfa zeMathematika, iiPLC nokubhalisa kwiikhosi ezimfutshane (umz. ezaseCTLI nezeAMESA) ukwenzela ukuphucula indlela ekufundiswa ngayo.

c) Ukukhankaselwa kwabasebenzi, ukufakwa kwabo emsebenzini kunye neendlela zokubagcina besemsebenzini

Ukukhankasa kwiiHEI abafundi abanezakhono zokufundisa imathematika. Ukunika ukuthathelwa ingqalelo nokunika amaqithi-qithi ukwenzela ukugcina ootitshala abanamava nabaneziphumo ezihle kwibanga lesi-4 – 7. Ukukhuthaza ukuqeshwa kootitshala abawaziyo umsebenzi wabo. Ukunika isibonelelo sebhasari yootitshala beIP. Ukuyilwa kwenkqubo yokufakwa emsebenzini (yiCTLI) kootitshala abatsha ukwenzela ukuqhuba ezona ndlela zisebenzayo zokufundisa kunye nokuphuhlisa izakhono zokufundisa ezifanelekileyo. Ukunika uqeqesho olufanelekileyo kuzo zonke iititshala ezifikayo ukwenzela ukuqinisekisa ukuba bayakwazi ukuyiqhuba ngempumelelo iCAPS.

d) Ukuzithemba kwabafundi, icala elilandelwa ngabafundi kunye nokuzilawula kakuhle kwabafundi

Ukuxhasa abafundi ukuba bakhule ukuzithemba okusekelwe "kwindlela yokucinga ngendlela yokuzihlumisa" kunoko kusekelwe "kwindlela yokucinga engatshintshekiyo". Ukuze oku kwenzeke, abafundi badinga ukukhokelwa okucacileyo nokuzinzileyo okuvela kootitshala ukuze baye bemana ukunikwa uxanduva kunye nokuthatha amanyathelo afanelekileyo okusingatha ubuthathaka. Ukuseka imeko eqhelekileyo yeklasi eqinisekisa ukuba abafundi bayakonwabela ukufunda yaye bayakuqonda ukuba kutheni kubalulekile ukufunda kwabo. Ukukhuthaza ukufundisa okuncedisa abafundi ukuba banxulumanise ulwazi lwabo nolo lwazi basuka nalo emakhaya, ukunxulumanisa ulwazi olutsha kunye nelizwe elingaphaya kwegumbi lokufundela kunye nokunxulumanisa ulwazi ngaphakathi kwisifundo kunye nokulunxulumanisa nezinye izifundo.

e) Ukubandakanyeka kwabazali

Ukwazisa malunga nesi sicwangciso-nkqubo seMathematika njengesicwangciso sophuculo. Ukuqhuba iindlela ezifanelekileyo zokuqinisekisa ngenkxaso yabazali noluntu ukwenzela ukuba iMathematika ikwazi ukufikeleleka kubafundi bonke. Ukuxoxa nabazali malunga nezakhono ezidingwa ngabantwana babo ukuze babe nolwazi lweMathematika. Ukukhuthaza abazali ukuba baxhase iithagethi zesikolo yaye babancedise abafundi emakhaya. Ukwazisa abazali kwiinkqubo zenkxaso ukwenzela ukuba bakwazi ukuxoxa malunga neendlela zokufundisa ezisetyenziswa eklasini.

f) Ubambiswano lokwenza okuthile

Ukusetyenziswa kwabaniki beenkonzo ukuncedisa ekuqeqeshweni kooHoD nootitshala kumxholo weMathematika kunye neendlela zokuyifundisa kunye nokusetyenziswa ngokukuka kweencwadi zokusebenzela zabafundi zeSASOL-Inzalo. Ukubambisana nezenzo ezenziwa ziiNGO, iiHEI namacandelo abucala apho kunikwa ootitshala inkxaso yasesikolweni.

5.2.2 Ukusetyenziswa kweendlela zokufundisa ezisebenzayo

a) Ukugxila kumgangatho wengqiqo

Kufuneka kwenziwe iinzame zokuphuhlisa ulwazi nokuqondwa okunzulu kwemixholo. Ukuyila, ukubonisa nokuqhuba iinkqubo ezilungiselelweyo zeMathematika engasebenzisi zixhobo (Mental Mathematics). Imisebenzi yokuhlola kwesi sigaba kufuneka ixananazele kumazinga engqiqo ohlukeneyo.

b) Ulwimi eklasini yeMathematika

Ulwimi sisixhobo esiyimfuneko ekuveliseni nasekudluliseni intsingiselo. Ukusetyenziswa kwesigama seMathematika esichanekileyo kwiincoko ezimalunga nokufunda kunye nokukhuthaza iindlela ezisingatha iinjongo zolwimi kwiMathematika. Ukukhuthaza iincoko ezizinzileyo nezinentsingiselo eziphakathi kootitshala nabafundi neziquka imiba nezimvo ezibalulekileyo ezichaphazelekayo kwimathematika.

c) Ukuhlolela ukuncedisana nokufunda nokufundisa

Ukuhlolela ukufundisa, ukusebenzisa imisetyenzana yokuhlola okusesikweni kunye nokuhlola okungekho sikweni ukukhokela ukufunda xa abafundi bebonakalisa ukubonisa umsantsa ekuqondeni imixholo. Ukunika abafundi ingxelo ekhawulezileyo kunye neempendulo ezijonge ekuvaleni umsantsa ophakathi kweyona mpumelelo yabafundi kunye nempumelelo efunekayo. Ukusetyenziswa koku kuhlola ekuyileni izicwangciso zokuphucula ukuqonda kwabafundi.

d) Ulawulo olusemgangathweni lweklasi

Ukudala imeko yeklasi ebamkelayo bonke abafundi, exhasayo, ekhuthazayo negxile ekufundeni ukuze abafundi bakwazi ukukufezekisa ngokupheleleyo oko banamandla okukwenza. Ukuphembelela ukuqeqesheka, ukuzinika ixesha lokusebenza kunye nokufundisa ngokuba ngumzekelo. Ukukhuthaza ootitshala ukuba bayile amagumbi okufundela anobutyebi bezixhobo zeMathematika naxhasa ukufunda nokufundisa okusebenzayo. Ukufunda nokufundisa kufuneka kuphawuleke ngokuba nenzolo kunye namalungiselelo afanelekileyo aza kwenza ukuba umfundi ngamnye akwazi ukukufezekisa ngokupheleleyo oko anamandla okukwenza.

d) Ukutolikwa ngendlela komgaqo-nkqubo

Ukuqinisekisa ukuba iinqununu, ooHoD, nootitshala bayitolika ngokuchanekileyo ikharityhulam yeMathematika mayela neemfuno zokufundisa nokuhlola ngokunjalo nangokwabiwa kwamaxesha ayo okufundisa (time-tabling) eIP. Ukuqinisekisa ukuba imathematika yabelwa ize isebenzise ixesha elaneleyo lokufundiswa kwayo.

5.2.3 Ukunikwa nokusetyenziswa kwezixhobo/kwezakhiwo

a) Ukufumana izakhiwo / izixhobo ezifanelekileyo

Izikolo zizo ezilawula ukuthenga iincwadi zabafundi (iitekstbhukhu, izixhobo ezifanele ibanga elithile ezincedisa abafundi ekufundeni kunye neekiti zokubonisa zootitshala. Zikwaqinisekisa nangokusiwa kweencwadi zokusebenzela zabafundi zeSebe iDBE neSASOL-Inzalo kubo bonke abafundi. Izikolo kufuneka zigcine iirejista zeeasethi ukwenzela ukubeka esweni ukusetyenziswa nokugcinwa kwezixhobo zize zisebenzise iimali ezabiweyo kunye nezinye iindlela ukuncedisana nokufumana izixhobo/izakhiwo ezifunekayo ukuqhuba isiCwangciso seSikolo soPhuculo kwiMathematika.

b) Ukusetyenziswa ngokukuko kwezixhobo

Ukwenza ukuba ootitshala bafumane ithuba lokusebenzisa ngokufanelekileyo izixhobo neemathiriyeli zokufunda nokufundisa. Ukuncedisa amaqela esigaba ukuba ayicwangcisele kwangoko ikota nganye ukuze bachonge izixhobo ezifunekayo ukulungiselela ukufundisa, ukufunda nokuhlola. Ukusebenzisa iiPLC ukwabelana malunga nokusetyenziswa ngempumelelo kwezixhobo ezifumaneka lula ukwenzela ukunceda ekufundiseni imiba ephambili kwiMathematika yebanga 4 – 7.

c) Ukusetyenziswa kokufunda okusebenzisa i-intanethi (ie-learning) ukunzulisa ulwazi nokuqonda

Bonke ootitshala bayakwazi ukusebenzisa iikhompyutha kunye nezinye izixhobo zedijithali ngokunjalo nokufikela kwimithombo yokufundisa/yokufunda ekwiIntanethi. Ukuxhasa ootitshala ekuchongeni izixhobo zokufundisa ze-e-learning ezixhasa ukufundisa nezinzulisa ulwazi lwabafundi kunye nokuqonda okunengqiqo. Ukuphononongwa nokucebisa malunga neesoftwe ze-e-learning kunye nezixhobo zedijithali ezixhasa ukufunda kwemathematika eIP. Ukufakwa kweemathiriyeli ezifanelekileyo kwiseva yeSebe iWCED. Ukukhuthaza abazali ukuba bafumane baze basebenzise iiprogram zesoftwe ezivunyiweyo zasimahla kunye nezixhobo zedijithali eziza kusetyenziswa ekhaya ukuxhasa abafundi. Ukusetyenziswa kweePLC ukuyila idathabheyisi yokufundisa, ukuhlola nezixhobo zokufundisa ezisekelwe kwiwebhusayithi ezilungiselelwe umxholo ngamnye webanga 4 – 7.

5.2.4 UkuBekwa eSweni nokuHlolwa

a) Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba lesikolo

Isikolo ngasinye kufuneka senze isicwangciso sophuculo seMathematika esiqhutywa ziithagethi esilungiselelwe ibanga lesi-4 – 7. Kufuneka kudityanwe nabasebenzi abafanelekileyo. Ukubekwa esweni kokufunda nokufundisa ngokulandelela inkqubela nokulungisa izicwangciso. Ukuhlolwa kokusebenza kunye nefuthe lokuhlola ngokubeka esweni ukufundiswa kwekharityhulam kunye nendlela ekuqhutywa ngayo. Ukuqhubeka nokuphucula indlela ekuqhutywa ngayo kwiMathematika ngokuthi kulungiswe iSBA yasesikolweni ngokwedatha efunyenwe kukuhlolwa kwenkqubo kukazwelonke nokwephondo. Izikolo kufuneka zilandele umgaqo-nkqubo wokumodareyitha kwasesikolweni zize ziqhubeke nokuwuphucula zithathela ingqalelo uphuhliso lwesifundo kunye neendlela ezingcono zokufundisa. Ii-SMT kufuneka zixhase iHoD yesifundo ekulawuleni iqela lesifundo sebanga lesi-4 – 7 ngokuqinisekisa ukuba ixesha lokufundiswa lisetyenziswa ngokufanelekileyo, ngokumodareyithwa kokuhlola kunye noxanduva lokusingatha izinto ezingenzekanga kakuhle. Ukuphuhlisa izakhono zooHoD neentloko zesifundo seMathematika ukuze balandelele inkqubela yokufundisa, ukufunda nokuhlola. Ukuphucula ukulawulwa nokubekwa esweni kwezakhono zeeSMT.

b) Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba lesithili

Izithili kufuneka zenze isiCwangciso sokuPhucula iMathematika esihambelana neeDIP zazo ukwenzela ukuba zinike ingxelo kwizitraktrsha zephondo nezikazwelonke. IiCM neeSA kufuneka zinike ingxelo ezithilini malunga nenkqubela kunye nenkxaso esekelwe kwisicwangciso, apho kuyimfuneko. Ukuphucula izakhono zokulawula nokubeka esweni zawo onke amagosa ezithili. Ukumodareyithwa kwezicwangciso zokufundisa kunye neencwadi zokubhalela zabafundi ukwenzela ukukhangela ukuba imisantsa iyasingathwa na. Ukumodareyitha nokuqinisekisa ukuhlola ngokuqinisekisa ukuba zonke izikolo zilandela umgaqo-nkqubo wokumodareyitha wangaphakathi esikolweni.

c) Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba likaNdlunkulu

Ukuphuhlisa izakhono zokulawula nokubeka esweni zawo onke amagosa akwaNdlunkulu. Ukuphandwa kweziphumo zeemvavanyo ezisetwe ngaphandle ukwenzela ukukhangela imisantsa kulwazi nto leyo iya kuncedisana neendlela zokuxhasa ootitshala kunye nezicwangciso zophuculo zezikolo nezezithili ezeniwa rhoqo ngonyaka.

Ukuphembelela uyilo lweekhosi zophuhliso nobunkokeli bootitshala. Ukuquka ukubekwa esweni nokuxhaswa kwiMathematika ngeekhosi zokungeniswa emsebenzini (induction) ezeniwa yiCTLT kuzo zonke izithuba zolawulo nobunkokeli. Ukuphononongwa esi sicwangciso-nkqubo rhoqo ngonyaka ukwenzela ukuqinisekisa ukuba iithagethi zesicwangciso-nkqubo seMathematika ziyafezekiswa, kuze apho kuyimfuneko kwenziwe uhlenga-hlengiso oluya kuqinisekisa ngokuqhutywa kwaso ngokuyimpumelelo.

d) Ukukhuthazwa kwesi sifundo kunye nesi sicwangciso-nkqubo

Ukuhlola ukuqondwa kokuqhutywa kwesiCwangciso-nkqubo seMathematika sephondo zizithili, izikolo kunye neendawo zoluntu. Ukuqinisekisa ukuba bonke abo bathatha inxaxheba bayakuqonda ukubaluleka kwesi sicwangciso-nkqubo yaye banika izizathu zotshintsho kwisicwangciso-nkqubo esicwangcisiweyo, ukuba oko kuyimfuneko.

5.3 IBanga 8 – 9

5.3.1 Ukuphuhliswa kwabantu

a) Uqeqesho lweetitshala namagosa ezemfundo

Ukuxhasa ukuyilwa kwezicwangciso zokufundisa ezifanelekileyo ngokwemeko nezithathela ingqalelo izibeki-mgangatho (pace setters) zeMathematika. Ukuqhuba uphicotho lwezakhono nokuseka idathabheyisi ebonisa izakhono zootitshala beMathematika ukwenzela ukukhangela iimfuno zoqeqesho kulwazi lomxholo kunye nolwazi lweendlela zokufundisa. Ukugxilisa uqeqesho kwizihloko ezithile eziphambili ezibonakalisa ubunzima ekubeni ootitshala nabafundi baziqonde, njengejiyometri yamaEuclide, iifankshini neegrafu, iinkcukacha-manani kunye noqikelelo (iprobhabhilithi). Ukukhuthaza ukuqondwa okunzulu kokuqhubeka kwekharityhulam kunye nenkqubela phambili kuwo onke amabanga ukusuka kwibanga lesi-4 naseFET. Ukuphucula izakhono zootitshala ekusebenziseni izakhono ezifuna ingqiqo ekwinqanaba eliphezulu xa befundisa naxa behlola. Ukunika inkxaso ekufundiseni okwahlukeneyo (differentiated teaching) kunye nokufundisa okongezelelweyo.

b) Amaqela ootitshala/amagosa axhasana ngezakhono (iiProfessional Learning Community - iiPLC)

Ukukhokela ooHoD, iintloko zezifundo kunye nootitshala abakhokela izifundo ukuba baqale, bancedise baze basebenzise iiPLC ezikolweni naphakathi kwezikolo ukwenzela ukukhuthaza ukwabelana ngezona ndlela zisebenzayo kwanokusebenza ngokubambisana. Ukuthathela ingqalelo nokunika iamaqithi-qithi ootitshala abakhokela izifundo/abalungiseleli beePCL. Ukusebenzisa iiPLC ukuzinzisa uphuhliso lootitshala kunye nokwenza ukuba izikolo zisebenzisane ekunikeni bonke abafundi eyona mfundo yeMathematika inokufumaneka. Ukuqhuba iiseshoni zokusebenza zeePLC/zamaqela (iiklasta) apho kuya kujongwa imisantsa yokufundisa efunyenwe kwiSBA kunye novavanyo lwenkqubo. Ukukhuthaza ukuba kuyiwe kwiinkomfa zeMathematika, iiPLC nokubhalisa kwiikhosi ezimfutshane (umz. ezaseCTLI nezeAMESA) ukwenzela ukuphucula indlela ekufundiswa ngayo.

c) Ukukhankaselwa kwabasebenzi, ukufakwa kwabo emsebenzini kunye neendlela zokubagcina besemsebenzini

Ukuqhuba umsebenzi omandla wokutsalwa komdla weetitshala ezinezakhono zemathematika. Ukunika ukuthathelwa ingqalelo nokunika amaqithi-qithi ukwenzela ukugcina ootitshala abanamava nabaneziphumo ezihle kwibanga lesi-8 nele-9. Ukukhuthaza ukuqeshwa kootitshala abawaziyo umsebenzi wabo. Ukunika izibonelelo zeebhasari kootitshala beMathematika bebanga lesi-8 nele-9. Ukuyilwa kwenkqubo yokungeniswa emsebenzini (induction) kootitshala abatsha ukwenzela ukuqhuba ezona ndlela zisebenzayo zokufundisa kunye nokuphuhlisa izakhono zokufundisa iMathematika. Ukusebenzisa ootitshala abaziingcali ukuba bancedise ootitshala abatsha bemathematika. Ukunika uqeqesho olufanelekileyo kuzo zonke iititshala ezifikayo ukwenzela ukuqinisekisa ukuba bayakwazi ukuyiqhuba ngempumelelo iCAPS.

d) Ukuzithemba kwabafundi, icala elilandelwa ngabafundi kunye nokuzilawula kakuhle kwabafundi

Ukuxhasa abafundi bakhule ukuzithemba okusekelwe "kwindlela yokucinga ngendlela yokuzihlumisa" kunoko kusekelwe "kwindlela yokucinga engatshintshekiyo". Ukuze oku kwenzeke, abafundi badinga ukukhokelwa okucacileyo nokuzinzileyo okuvela kootitshala ukuze baye bemana ukunikwa uxanduva kunye nokuthatha amanyathelo afanelekileyo okusingatha ubuthathaka. Ukunceda abafundi ukuba baqonde ukuba kubalulekile ukufunda kwabo. Ukukhuthaza ukufundisa okuncedisa abafundi ukuba banxulumanise ulwazi lwabo nolo lwazi basuka nalo emakhaya, ukunxulumanisa ulwazi olutsha kunye nelizwe elingaphaya kwegumbi lokufundela kunye nokunxulumanisa ulwazi ngaphakathi kwisifundo kunye nokulunxulumanisa nezinye izifundo. Abafundi kufuneka basebenzise incwadana ethi "Ukutshintsha ukusuka kwiBanga le-9 ukuya kwiBanga le-10: Iingcebiso zempumelelo" ukwenzela ukulungiselela iinjongo zemfundo yabo.

e) Ukubandakanyeka kwabazali

Ukuqhuba iindlela ezifanelekileyo zokuqinisekisa ngenkxaso yabazali noluntu ukwenzela ukubonisa ukubaluleka kweMathematika yaseFP. Ukukhuthaza abazali ukuba baxhase iithagethi zesikolo yaye babancedise abafundi emakhaya kumsebenzi wasekhaya wemathematika. Ukwazisa malunga nesi sicwangciso-nkqubo seMathematika njengesicwangciso sophuculo ebantwaneni babo. Ukuxoxa nabazali malunga nezakhono ezidingwa ngabantwana babo ukuze babe nolwazi lweMathematika.

f) Ubambiswano lokwenza okuthile

Ukuseka ubambiswano lokwenza okuthile kunye neeNGO, iiHEI kunye namacandelo abucala ukwenzela ukukhuthaza ukuthathwa kwenxaxheba kunye nokuqhuba kakuhle kwiMathematika. Ukubhexesha ukuqeqeshwa kweeSMT ukuze zibe nakho ukuqhuba esi sicwangciso-nkqubo seMathematika sephondo ezikolweni zazo, zisenzela ukufikelela kwiithagethi ezibekiweyo. Ukunika uqeqesho olwaneleyo nolufanelekileyo kootitshala nooHoD beMathematika. Ukukhuthaza ukuthathwa kwenxaxheba kwiinkomfa zemibutho yemathematika yangaphandle, iikomiti zezifundo, iiPLC, njalo njalo. Ukubambisana kwizenzo zeeNGO, iiHEI namacandelo abucala anika ootitshala inkxaso yasesikolweni.

IBanga lesi-8 – 9

Ukucaciswa kwesi siCwangciso-nkqubo ngokwesiGaba ngasinye >>> IBanga lesi-8 – 9

IsiCwangciso-nkqubo seMathematika sika-**2015 – 2019** **21**

5.3.2 Ukusetyenziswa kweendlela zokufundisa ezisebenzayo

a) Ukugxila kumgangatho wengqiqo

Nangona kubalulekile ukuqondwa kwemixholo engundoqo yeMathematika, kufuneka kuzanywe kangangoko ukugxila kwizakhono zengqiqo ephezulu ezifana nokufala (application) kunye nokusombulula iingxaki ukwenzela ukuphuhlisa ulwazi nokuqondwa okunzulu kwemixholo. Ukusebenzisa imibuzo ehlupheza ukusetyenziswa koluhlu lwamazinga engqiqo. Imisebenzi yokuhlola kwesi sigaba kufuneka ixananazele kumazinga engqiqo ohlukeneyo.

b) Ulwimi eklasini yeMathematika

Ulwimi lubalulekile ekufundeni yaye kufuneka lukhuthazwe ekufundisweni kweMathematika. Ukusetyenziswa kwesigama esichanekileyo semathemathika. Ukukhuthazwa kweendlela ezisingatha ukusetyenziswa kolwimi kwimathematika nanjengoko ulwimi lusisixhobo esibalulekileyo sokuveza nokudlulisa intsingiselo. Ukukhuthaza iincoko ezimandla phakathi kootitshala nabafudni beMathematika naphakathi kwabafundi, ngxoxo ezo kufuneka zibe malunga nemixhono nezimvo ezibalulekileyo. Le ngxoxo kufuneka yenziwe ngomlomo, ibhalwe, iboniswe kwigrafu iboniswe nangeesimboli.

c) Ukuhlolela ukuncedisana nokufunda nokufundisa

Ugxininiso malube sekuhloleni okulungiselela ukufundisa. Oku kuya kukhokelela ekulandelweni kwamanqanaba ayilelwe ukuvala imisantsa ekuqondeni nokwenzela ukuqiniseka ukuba abafundi bayaphuhliseka kulwazi lwemathematika ngokokude bakwazi ukuyikhetha imathematika kwinqanaba laseFET. Ukunika abafundi ingxelo ekhawulezileyo kunye nokufundisa ngokwendlela ekulindelwe ukuba baqhube ngayo abafundi, zinto ezo zijonge ukubakhokelela ukuba bafumane iithagethi ezibekiweyo zokufunda (learning). Ukuyila imisebenzi yokuhlola enika ulwazi olufanelekileyo malunga nempumelelo yokufunda nokufundisa. Ootitshala kufuneka basebenzise imisetyenzana eyimizekelo yokuhlola xa beyila imisetyenzana yabo eyimpendulo yeemfuno zikatitshana nabafundi.

d) Ulawulo olusemgangathweni lweklasi

Ukudala imeko yeklasi ebamkelayo bonke abafundi, exhasayo, ekhuthazayo negxile ekufundeni ukuze abafundi bakwazi ukukufezekisa ngokupheleleyo oko banamandla okukwenza. Ukuphembelela ukuqeqesheka, ukuzinika ixesha lokusebenza kunye nokufundisa ngokuba ngumzekelo. Ukukhuthaza ootitshala ukuba bayile amagumbi okufundela anobutyebi bezixhobo zeMathematika naxhasa ukufunda nokufundisa okusebenzayo. Iindibano zokufunda nokufundisa zizibonakalisa ngokuba nocwangco, ukulungiselelwa kakuhle kunye nokuqhuba ngendlela enye.

e) Ukutolika kakuhle umgaqo-nkqubo

Ukuqinisekisa ukuba iinqunu, ooHoD, nootitshala bayitolika ngokuchanekileyo ikharityhulam yolwimi mayela neemfuno zokufundisa nokuhlola ngokunjalo nangokwabiwa kwamaxesha ayo okufundisa (time-tabling) kwibanga lesi-8 nele-9. Ukuxhasa ootitshala ukuba bakuqonde ukuqhubeleka nokuqhubela phambili kwezakhono zemathematika ukusuka eIP ukuya eSP kunye nendlela oku okwenza ngayo isiseko sokufunda imathematika kwibanga le-10 ukuya kwele-12.

5.3.3 Ukunikwa nokusetyenziswa kwezixhobo/kwezakhiwo

a) Ukufumana izakhiwo / izixhobo ezifanelekileyo

Ukulawula ukuthengwa nokongezwa kweencwadi zabafundi (iitekstibhukhu) zeMathematika kunye nokusiwa kweencwadi zokusebenzela zabafundi (iworkbook) zeSebe iDBE nezeSASOL-Inzalo kubo bonke abafundi. Ukuthengwa kwezixhobo zokuxhasa ukufunda nokufundisa ezifanele iBanga elo. Kufuneka ootitshala bagcine iirejista zokulawula ukusetyenziswa nokugcinwa kwezixhobo. Izikolo kufuneka zigcine iirejista zeeasethi zezixhobo zeMathematika zize zisebenzise zonke iimali ezibiweyo kunye nezinye iindlela ukuncedisana nokufumana izixhobo/izakhiwo ezifunekayo ukuqhuba isiCwangciso seSikolo soPhuculo kwiMathematika.

b) Ukusetyenziswa ngokukuko kwezixhobo

Ukuqinisekisa ukuba bonke ootitshala bayakwazi ukusebenzisa iikhompyutha kunye nezinye izixhobo zedijithali ngokunjalo nokufikela kwimithombo yokufundisa/yokufunda ekwiIntanethi. Ukwenza ukuba ootitshala bafumane ithuba lokusebenzisa ngokufanelekileyo izixhobo neemathiriyeli zokufunda nokufundisa ezifanele isigaba esithile. Ukuncedisa amaqela esigaba ukuba ayicwangcisele kwangoko ikota nganye ukuze bafumane izixhobo ezifunekayo ukulungiselela ukufundisa, ukufunda nokuhlola. Ukusebenzisa iiPLC ukwabelana malunga nokusetyenziswa ngempumelelo kwezixhobo ezifumanekayo ukwenzela ukunceda ekufundiseni imiba ephambili kwiMathematika yaseSP. Ukukhuthaza ukubambisana kwezikolo ukuyila nokwabelana ngezixhobo nezakhiwo.

c) *Ukusetyenziswa kokufunda okusebenzisa i-intanethi (ie-learning) ukunzulisa ulwazi nokuqonda*

Ukuxhasa ootitshala ekukhetheni izixhobo zokufunda okusebenzisa i-intanethi (e-learning resources) ukwenzela ukuphucula ukufundisa kunye nokunzulisa ulwazi nokuqonda kwabafundi imixholo nezakhono. Ukuphononga nokucebisa malunga nesoftwe ye-e-learning enokusetyenziswa ukuxhasa ukufunda kweso sigaba. Ukufakwa kweemathiriyeli ezifanelekileyo kwiseva yeSebe iWCED. Ukukhuthaza abazali ukuba bafumane baze basebenzise iiprogram zesoftwe ezivunyiweyo zasimahla kunye nezixhobo zedijithali eziza kusetyenziswa ekhaya ukuxhasa abafundi. Ukusetyenziswa kweePLC ukuyila idathabheyisi yokufundisa, ukuhlola nezixhobo zokufundisa ezisekelwe kwiwebhusayithi ezilungiselelwe umxholo ngamnye waseSP.

5.3.4 UkuBekwa eSweni nokuHlolwa

a) *Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba lesikolo*

Isikolo ngasinye kufuneka senze isicwangciso sophuculo seMathematika esiqhutywa ziithagethi esinezimvo zabasebenzi bonke esilungiselelwe ibanga lesi-8 nele-9. Ukubeka esweni ukufunda nokufundisa ngokulandelela inkqubela kwanokuhlenga-hlengisa iindlela zokufundisa apho kuyimfuneko. Ukuhlolwa kokusebenza kunye nefuthe lokuhlola ngokubeka esweni ukufundiswa kwekharityhulam kunye nendlela ekuqhutywa ngayo kwiSBA. Ukuqhubeka nokuphucula indlela ekuqhutywa ngayo kwiMathematika ngokuthi kulungiswe iSBA yasesikolweni ngokwedatha efunyenwe kukuhlolwa kwenkqubo kukazwelonke nokwephondo. Ukuqinisekisa ukuba izikolo ziyaqhubeka nokuphucula umgaqo-nkqubo wokumodareyithwa kwangaphakathi zize ziwulandele loo mgaqo-nkqubo. Ii-SMT kufuneka zixhase iHoD yeMathematika kunye nentloko yesi sifundo ekulawuleni iqela laseSP ngokuqinisekisa ngokusetyenziswa ngokukuko kwexesha, ngokumodareyithwa kokuhlola kunye noxanduva lokusingatha imisantsa ethe yafumaneka. Ukwabelana ngezona ndlela zokusebenza ziyimpumelelo ngokunxulumene nokubekwa esweni kwenkqubo yokumodareyitha kuwo onke amanqanaba kwisistim yesikolo. Ukuphuhlisa izakhono zokulawulwa nokubeka esweni ezinazo iiSMT.

b) *Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba lesithili*

Izithili kufuneka zenze isiCwangciso sokuPhucula iMathematika kwiiDIP zazo ukwenzela ukuba zinike ingxelo kwizitraktrsha zephondo nezikazwelonke. IiCM neeSA kufuneka zinike isithili ingxelo malunga nenkqubela. Ukunika uNdlunkulu iingxelo zekota. Ukuqinisekisa ngokuqeshwa kwabantu abafanelekileyo abaza komeleza iiSMT namacandelo (iikhomponenti) esithili.

c) *Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba likaNdlunkulu*

Ukuphuhlisa izakhono zokulawula nokubeka esweni zawo onke amagosa akwaNdlunkulu. Ukuphandwa kweziphumo zeemvavanyo ezisetwe ngaphandle ukwenzela ukukhangela imisantsa kulwazi nto leyo iya kuncedisana neendlela zokuxhasa ootitshala kunye nezicwangciso zophuculo zezikolo nezezithili.

Ukufuthela ukuyilwa kweekhosi zobunkokeli ukwenzela ukuphuhlisa ubunkokeli nolawulo lwekharityhulam olufezekisa iinjongo ezibekiweyo. Ukuquka ukubekwa esweni nokuxhaswa kweMathematika kwiikhosi zokungeniswa emsebenzini (induction) ezenziwa yiCTLT kuzo zonke izithuba zolawulo nobunkokeli. Ukuphononga esi sicwangciso-nkqubo seMathematika rhoqo ngonyaka ukwenzela ukuqinisekisa ukuba iithagethi zesicwangciso-nkqubo sangaphambili ziyafezekiswa, kuze apho kuyimfuneko kwenziwe ulungiso oluya kuqinisekisa ngokuqhutywa kwaso ngokuyimpumelelo.

d) *Ukukhuthazwa kwesi sifundo kunye nesi sicwangciso-nkqubo*

Ukuqinisekisa ukuba abafundi bayakuqonda ukubaluleka kokwazi kwabo imathematika. Ukusetyenziswa kovavanyo lokuhlolwa kwezidingo kwiMathematika yebanga lesi-8 kunye neemvavanyo zenkqubo (systemic tests) zebanga le-9 ukwenzela ukuqinisekisa ngokunyuka kwezinga lokuthathwa kwenxaxheba kwiMathematika kwiBanga le-10. Ukuhlola ukuqondwa kokuqhutywa kwesiCwangciso-nkqubo seMathematika sephondo zizithili, izikolo kunye neendawo zoluntu. Ukuqinisekisa ukuba bonke abafanele ukuthatha inxaxheba bayakuqonda ukubaluleka kwesi sicwangciso-nkqubo. Ukuxhasa utshintsho kwisicwangciso-nkqubo esicwangcisiweyo.

5.4 **IBanga 10 – 12**

5.4.1 **Ukuphuhliswa kwabantu**

a) *Uqeqesho lweetitshala namagosa ezemfundo*

Ukugxilisa uqeqesho kwizihloko ezithile eziphambili ezibonakalisa ubunzima ekubeni ootitshala nabafundi baziqonde, njengejiyometri yamaEuclide, iengile exananazileyo (ikhompawundi engile) yetrigonometri, ukusetyenziswa kwekhaltyhulasi, iifankshini neegrafu, iinkcukacha-manani kunye noqikelelo (iprobhabhilithi). Ukuxhasa ukuveliswa kwezicwangciso zokufundisa ezinakho ukwenzeka. Ukuqhubeleka nokusebenza okusekelwe ekuqondweni kokuqhubeleka kwekharityhulam kunye nenkqubela phambili kwibanga le-10 ukuya kwele-12. Ukuqinisekisa ngokuhambelana phakathi kweenjongo zokufunda, ukufundisa nokuhlola. Ukuphucula izakhono zootitshala ekusebenziseni izakhono ezifuna ingqiqo ekwinqanaba eliphezulu xa befundisa naxa behlola.

b) *Amaqela ootitshala/amagosa axhasana ngezakhono (iiProfessional Learning Community – iiPLC)*

Ukukhokela ooHoD, iintloko zezifundo kunye nootitshala abakhokela izifundo ukuba baqale, bancedise baze basebenzise iiPLC ezikolweni naphakathi kwezikolo ukwenzela ukukhuthaza ukwabelana ngezona ndlela zisebenzayo kwanokusebenza ngokubambisana. Ukuthathela ingqalelo nokunika iamaqithi-qithi ootitshala abakhokela izifundo/abalungiseleli beePCL. Ukusebenzisa iiPLC ukuzinzisa uphuhliso lootitshala kunye nokwenza ukuba izikolo zisebenzisane ekunikeni bonke abafundi okona kufundiswa kweMathematika kunokufumaneka. Ukuqhuba iiseshoni zokusebenza zeePLC apho kuya kujongwa imisantsa yokufundisa efunyenwe kwiSBA kunye novavanyo lwenkqubo. Ukukhuthaza ukuba kuyiwe kwiinkomfa zeMathematika, iiPLC nokubhalisa kwiikhosi ezimfutshane (umz. ezaseCTLI nezeAMESA) ukwenzela ukuphucula indlela ekufundiswa ngayo.

c) *Ukukhankaselwa kwabasebenzi, ukufakwa kwabo emsebenzini kunye neendlela zokubagcina besemsebenzini*

Ukuqhuba umsebenzi omandla wokukhankaswa kweetitshala ezinezakhono zemathematika ngokwezona ndawo bafuneka kakhulu kuzo. Ukuqhuba uhlalutyo lweemfuno zokukhula nokwehla kwamandla ukwenzela ukulungiselela ukukhankaselwa kokuqeshwa kootitshala beMathematika. Ukunika ukuthathelwa ingqalelo nokunika amaqithi-qithi ukwenzela ukugcina ootitshala baseFET abanamava nabaneziphumo ezihle. Ukuyila iinkqubo zokungeniswa emsebenzini kuwo onke amanqanaba. Abacebisi bezifundo kufuneka bangenise emsebenzini (induct) ootitshala abafikayo beMathematika yaseFET ngakumbi xa utitshala inguye yedwa kwelo nqanaba. Ukusebenzisa ootitshala abaziingcali ukuba bancedise ootitshala abatsha.

d) *Ukuzithemba kwabafundi, icala elilandelwa ngabafundi kunye nokuzilawula kakuhle kwabafundi*

Ukuxhasa abafundi ukuba bakhule ukuzithemba okusekelwe "kwindlela yokucinga ngendlela yokuzihlumisa" kunoko kusekelwe "kwindlela yokucinga engatshintshekiyo". Ukuze oku kwenzeke, abafundi badinga ukukhokelwa okucacileyo nokuzinzileyo okuvela kootitshala ukuze banikwe uxanduva kunye nokuthatha amanyathelo afanelekileyo okusingatha ubuthathaka. Ukuyila nokufundisa iingcebiso/izikhokelo zokufunda (study tips/guidelines) zabafundi beBanga le-12. Abafundi kufuneka basoloko befumana umsebenzi wasekhaya/wohlaziyo ukwenzela ukuba bakwazi ukuchonga iindawo abadinga ukuncedwa kuzo ngootitshala babo. Ukunceda abafundi ukuba baqonde ukuba kutheni kubalulekile ukufunda kwabo. Ukukhuthaza ukufundisa okuncedisa abafundi ukuba banxulumanise ulwazi lwabo nolo lwazi basuka nalo emakhaya, ukunxulumanisa ulwazi olutsha kunye nelizwe elingaphaya kwegumbi lokufundela kunye nokunxulumanisa ulwazi ngaphakathi kwisifundo kunye nokulunxulumanisa nezinye izifundo.

e) *Ukubandakanyeka kwabazali*

Ukukhuthaza abazali ukuba bathathe inxaxheba kwiinkqubo zemfundo yabantwana babo ngokuthi babaxhase ngokusebenzisa imisetyenzana yokugxininisa egqanyiswe ngemibala ethile kwiwebhusayithi yekharityhulam yeSebe iWCED. Ukwazisa malunga nesi sicwangciso-nkqubo seMathematika njengethuba elinokuphucula abafundi. Ukuxoxa nabazali malunga nezakhono ezidingwa ngabantwana babo ukuze babe nolwazi lweMathematika.

f) *Ubambiswano olubandakanyekayo*

Ukuseka ubambiswano lokwenza okuthile kunye neeNGO, iiHEI kunye namacandelo abucala ukwenzela ukukhuthaza ukuthathwa kwenxaxheba kunye nokuqhuba kakuhle kwiMathematika. Ukuququzelela ukufundisa kweetyhutha okwenziwa ziityhutha ezinamava ngethuba lezikolo zasebusika nasentwasahlobo. Ukubhexesha ukuqeqeshwa kweeSMT ukuze zibe nakho ukuqhuba esi sicwangciso-nkqubo seMathematika ezikolweni zazo, zisenzela ukufikelela kwiithagethi ezibekiweyo. Ukunika uqeqesho olwaneleyo nolufanelekileyo kootitshala nooHoD beMathematika. Ukukhuthaza ukuthathwa kwenxaxheba kwiinkomfa zemibutho yeMathematika yangaphandle (iAMESA), iikomiti zezifundo, iiPLC, njalo njalo. Ukubambisana kwizenzo zeeNGO, iiHEI namacandelo abucala anika ootitshala inkxaso yasesikolweni.

5.4.2 Ukusetyenziswa kweendlela zokufundisa ezisebenzayo

a) Ukugxila kumgangatho wengqiqo

Ukugxininiswa kwemixholo nezakhono zemathematika ezimiselweyo, ngelixa abafundi basoloko betyhalelwa kumanqanaba engqiqo ekwizinga elingaphezulu. Imisebenzi yokuhlola kufuneka iye ifuna ukuba kungaphelelwa nje ekuphindaphindweni kokukhunjulwa kokuthile kunye neenkqubo eziqhelekileyo, koko kugxile nasekuphuhliseni izakhono zengqiqo ezikwizinga elingaphezulu. Oku kuya kunceda abafundi ukuba babe nolwazi nokuyiqonda ngokunzulu imathematika. Ukugxininisa ukusetyenziswa kwesigama semathematika kwiLoLT ngethuba leencoko nemisebenzi yokufunda nokufundisa. Kufuneka kwenziwe iinzame zokuxhasa abafundi abaqhubele phambili kunye nabo baneemfuno ezizodwa zemfundo.

b) Ulwimi eklasini yeMathematika

Ulwimi lubalulekile ekufundeni yaye kufuneka lukhuthazwe ekufundisweni kweMathematika. Kufuneka kusoloko kusetyenziswa isigama esichanekileyo semathemathika. Ukukhuthazwa kweendlela ezisingatha iinjongo zolwimi kwiMathematika njengesixhobo esingundoqo ekuphuhliseni nasekudluliseni intsingiselo kwinqanaba laseFET. Ukukhuthaza unxibelelwano olunzulu phakathi kootitshala nabafudni beMathematika naphakathi kwabafundi, ngxoxo ezo kufuneka zibe malunga nemixhono nezimvo ezibalulekileyo. Le ngxoxo kufuneka yenziwe ngomlomo, ibhalwe, iboniswe kwigrafu iboniswe nangeesimboli. Ukuhlalutya idatha yokuhlola ukwenzela ukujonga iingxaki zolwimi nokucwangcisela ungenelelo oluyimfuneko.

c) Ukuhlolela ukuncedisana nokufunda nokufundisa

Kufuneka abafundi bakhuthazwe ukuba basebenzise amaphepha eemviwo zeminyaka edlulileyo kunye namaphepha ayimizekelo nayibonisa kakuhle eyona nto ifunekayo ezimviweni. Ugxininiso lokuhlola kufuneka lube sekusebenziseni ukuhlola njengesixhobo ekunokufundwa nto kuso. Ukunika abafundi ingxelo ekhawulezileyo kunye nokufundisa ngokwendlela ekulindelwe ukuba baqhube ngayo abafundi, zinto ezo zijonge ukubakhokelela ukuba bafumane iithagethi ezibekiweyo zokufunda (learning). Ukunikwa kwengxelo malunga nobuthathaka kunye nokufundisa ngokwendlela ekulindelwe ukuba baqhube ngayo abafundi malunga nenyathelo elilandelayo ekufuneka lithathwe ngumfundi. Le nto kufuneka ibe yiyo abakhela phezu kwayo ukwenza kwabo abafundi nanjengoko besebenzisa ubungqina/isikhokelo esivela koko kuhlolwa xa bezisebenzela bodwa bezama ukusingatha izinto ababuthathaka kuzo kwesi sifundo.

d) Ulawulo olusemgangathweni lweklasi

Ukudala imeko yeklasi ebamkelayo bonke abafundi, exhasayo, ekhuthazayo negxile ekufundeni ukuze abafundi bakwazi ukukufezekisa ngokupheleleyo oko banamandla okukwenza. Ukuphembelela ukuqeqesheka kunye nokufundisa ukwenza umsebenzi ngokuba ngumzekelo. Ukuba ootitshala bayile amagumbi okufundela anobutyebi bezixhobo zeMathematika naxhasa ukufunda nokufundisa okusebenzayo. Ukucwangciswa kokufunda ngokwenkqubo okubonakaliswa kukuzilungiselela kakuhle, ukuba noncwangco kuba nokubakhathalela abafundi bemathematika.

e) Ukutolikwa ngendlela komgaqo-nkqubo

Ukuqinisekisa ukuba iinqununu, iiHoD, ootitshala bayitolika ngokuchanekileyo ikharityhulam yeMathematika ebekiweyo ngokweemfuno zokufundisa nokuhlola ngokunjalo nokwabiwa kwamaxesha ayo okufundisa (time-tabling). Ukuxhasa ootitshala ukuba bakuqonde ukuqhubeleka nokuqhubela phambili kwezakhono zemathematika ukusuka eSP ukuya eFET kunye nendlela oku okwenza ngayo isiseko sokufunda imathematika naxa umntu sele ephumelele esikolweni, ebomini, emsebenzini nakwimfundo yasemva kwematrikhi.

5.4.3 Ukunikwa nokusetyenziswa kwezixhobo/kwezakhiwo

a) Ukufumana izakhiwo / izixhobo ezifanelekileyo

Ukulawula ukuthengwa nokongezwa kweencwadi zabafundi (iitekstibhukhu) zeMathematika kunye nokusiwa kweeLTSM zeSebe iDBE kunye nezinye ezisemgangathweni kubo bonke abafundi. Ukuthengwa nokufakwa kwezixhobo kwikhathalogu kuquka izixhobo ze-e-learning kunye nokuthengwa kwezixhobo nezixhobo ezincedisa ukufunda eziphelelweyo. Izikolo kufuneka zigcine iirejista zeeasethi zezixhobo zeMathematika zize zisebenzise zonke iimali ezabiweyo kunye nezinye iindlela ukuncedisana nokufumana izixhobo/izakhiwo ezifunekayo ukuqhuba isiCwangciso seSikolo soPhuculo kwiMathematika.

b) Ukusetyenziswa ngokukuko kwezixhobo

Ukuqinisekisa ukuba bonke ootitshala bayakwazi ukusebenzisa iikhompyutha kunye nezinye izixhobo zedijithali ngokunjalo nokufikela kwimithombo yokufundisa/yokufunda ekwiIntanethi. Ukuseka imeko yokufunda enobutyebi bezixhobo apho kukhuliswa ngeyona ndlela oko banakho ukukwenza abafundi ngokuthi banikwe iiteksti, iteknoloji nesoftwe efanelekileyo yamagumbi okufundela emathematika. Ukwenza ukuba ootitshala bafumane ithuba lokusebenzisa ngokufanelekileyo izixhobo neemathiriyeli zokufunda nokufundisa. Ukuncedisa amaqela ukuba ayicwangcisele kwangoko ikota nganye ukuze bafumane izixhobo ezifunekayo ekufundiseni nasekuhloleni. Ukusebenzisa iiPLC ukwabelana malunga nokusetyenziswa ngempumelelo kwezixhobo ukwenzela ukunceda ekufundiseni imiba ephambili kwiMathematika. Ukukhuthaza ukubambisana kwezikolo ukuyila nokwabelana ngezixhobo nezakhiwo. Ukuqeqesha nokuxhasa ootitshala kunye nabaCebisi besiFundo ekusebenziseni isoftwe evulelekileyo ukuba nabani na oyingcali akwazi ukuyitshintsha indlela esebenza ngayo (iopen source software) efanelekileyo yesi sifundo. Ukuseka uvimba wezixhobo zokufunda ezigqibeleleyo, zedijithali nezisephepheni.

c) Ukusetyenziswa kokufunda okusebenzisa i-intanethi (ie-learning) ukunzulisa ulwazi nokuqonda

Ukuxhasa ootitshala ekukhetheni izixhobo zokufunda okusebenzisa i-intanethi (e-learning resources) ukwenzela ukuphucula ukufundisa kunye nokunzulisa ulwazi nokuqonda kwabafundi imixholo nezakhono. Ukuphononga nokucebisa malunga nesoftwe ye-e-learning enokusetyenziswa ukuxhasa ukufundwa kweMathematika. Ukufakwa kweemathiriyeli ezifanelekileyo kwiseva yeSebe iWCED. Ukukhuthaza abazali ukuba bafumane baze basebenzise iiprogram zesoftwe ezivunyiweyo zasimahla kunye nezixhobo zedijithali eziza kusetyenziswa ekhaya ukuxhasa abafundi.

5.4.4 Ukubekwa esweni nokuHlolwa

a) Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba lesikolo

Isikolo ngasinye masenze isicwangciso sophuculo lwemathematika esiqhutywa ziithagethi nesibandakanya izimvo zabo bonke abasebenzi. Ukubeka esweni ukufunda nokufundisa ngokulandelela inkqubela kwanokuhlenga-hlengisa iindlela zokufundisa apho kuyimfuneko. Ukuhlolwa kokusebenza kunye nefuthe lokuhlola ngokubeka esweni ukufundiswa kwekharityhulam kunye nendlela ekuqhutywa ngayo kwiSBA ezikolweni.. Ukuqhubeka nokuphucula indlela ekuqhutywa ngayo kwiMathematika ngokuthi kulungiswe iSBA yasesikolweni ngokwedatha efunyenwe kukuhlolwa kwenkqubo kukazwelonke nokwephondo. Ukuqinisekisa ukuba izikolo ziyaqhubeka nokuphucula umgaqo-nkqubo wokumodareyithwa kwangaphakathi zize ziwulandele loo mgaqo-nkqubo. Ii-SMT kufuneka zixhase iHoD/utitshala oyintloko yeMathematika ekulawuleni iqela lootitshala beMathematika ngokuqinisekisa ngokusetyenziswa ngokukuko kwexesha, ngokumodareyithwa kokuhlola kunye noxanduva lokusingatha iingxaki ezifunyanisiweyo. Ukwabelana ngezona ndlela zokusebenza ziyimpumelelo ngokunxulumene nokubekwa esweni kwenkqubo yokumodareyitha kuwo onke amanqanaba kwisistim yesikolo. Ukuphuhlisa izakhono zokulawulwa nokubeka esweni ezinazo iiSMT.

b) Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba lesithili

Izithili kufuneka zenze isicwangciso sokuphucula iMathematika kwiiDIP zazo ezibonakalisa ukuhambelana, ukwenzela ukuba zinike ingxelo kwizitraktrsha zephondo nezikazwelonke. IiCM neeSA kufuneka zinike isithili ingxelo malunga nenkqubela. Ukunika izithili iingxelo zekota ezimalunga nenkqubela phambili ekufezekisweni kweenjongo. Ukuqinisekisa ngokuqeshwa kwabantu abafanelekileyo abaza komeleza iiSMT namacandelo (iikhomponenti) esithili nakandlunkulu.

c) Ukumana kujongwa kulungiswa iindlela zokufundisa kwinqanaba likaNdlunkulu

Ukuphuhlisa izakhono zokulawula nokubeka esweni zawo onke amagosa akwaNdlunkulu. Ukuphandwa kweziphumo zeemvavanyo ezisetwe ngaphandle ukwenzela ukukhangela imisantsa kulwazi nto leyo iya kuncedisana namaphulo okuxhaswa kokufundisa ezikolweni nasezithilini. Ukufuthela ukuyilwa kweekhosi zobunkokeli ukwenzela ukuphuhlisa ubunkokeli nolawulo lwekharityhulam olufezekisa iinjongo ezibekiweyo. Ukuquka ukubekwa esweni nokuxhaswa kwiMathematika ngeekhosi zokungeniswa emsebenzini (induction) ezenziwa yiCTLT kuzo zonke izithuba zolawulo nobunkokeli. Ukuphononga esi sicwangciso-nkqubo rhoqo ngonyanga ukwenzela ukuqinisekisa ukuba iithagethi zesi sicwangciso-nkqubo ziyafezekiswa, kuze apho kuyimfuneko kwenziwe uhlenga-hlengiso oluya kuqinisekisa ngokuqhutywa kwaso ngokuyimpumelelo.

d) Ukukhuthazwa kwesi sifundo kunye nesi sicwangciso-nkqubo

Ukuqinisekisa ukuba abafundi bayakuqonda ukubaluleka kokwazi imathematika kunye nokuba iMathematika ibe yenye yezifundo abazikhethayo kwimfundo ephakamileyo. Ukuhlola ukuqondwa kokuqhutywa kwesiCwangciso-nkqubo seMathematika sephondo zizithili, izikolo kunye neendawo zoluntu. Ukuqinisekisa ukuba bonke abafanele ukuthatha inxaxheba bayakuqonda ukubaluleka kwesi sicwangciso-nkqubo sephondo. Ukuxhasa utshintsho kwisicwangciso-nkqubo esicwangcisiweyo.

6 > Isiphelo

ISebe leMfundo leNtshona Koloni liqalise uluhlu lwezenzo ezitsha kule minyaka ingama-20 idlulileyo lisenzela ukuphucula imfundo yeMathematika.

Ezi zenzo zisaqhutywa yaye zikwajonge ukumana ziphononongwa zihlaziywa ngokuqhubekayo. Siyakwazi ukukhomba izinto esizifumeneyo, iziphumo zethu zeemvavanyo zenkqubo kunye nezesiQinisekiso sikaZwelonke seMatrikhi zibonisa ukuba kusekude apho kufuneka sihambe indima ende phambi kokuba saneliseke ziziphumo zethu.

Siza kuqhubeleka nokusebenzela kwimpumelelo yethu, ngelixa sifunda kumava ethu, kuphando lwakutsha nje nakwezona ndlela zisebenza ngcono ehlabathini.

Esi sicwangciso-nkqubo sigxile kwimiba emine yempumelelo ephambili, eyile: Ukuphuhliswa kwabantu, iindlela zokufundisa ezisebenzayo, izixhobo, izakhiwo kunye nokuphononongwa okuqhubelekayo. Le miba iya kusikhokela kule minyaka mihlanu izayo njengoko sizama ukuqinisekisa ngokufundisa okusemgangathweni kunye nokufunda okusemgangathweni.

Ngelixa sisebenzisa esi sicwangciso-nkqubo ukuxhasa ukufundwa nokufundiswa kwemathematika, sikholelwa ukuba sinakho ukusebenzisa le ndlela inye ukuphucula imfundo xa iyonke kweli phondo. Siza kusebenzisa le ndlela njengokuba sisenza izicwangciso-nkqubo nezikolo zethu ukwenzela ukunika abafundi bethu awona mathuba angcono okufunda nokufundisa.

> " Siza kusebenzisa le ndlela njengokuba sisenza izicwangciso-nkqubo nezikolo zethu ukwenzela ukunika abafundi bethu awona mathuba angcono okufunda nokufundisa. "

7 >IziHlomelo

7.1 IsiHlomelo soku-1: Iidayimenshini nemiba yeendlela zokufundisa ezisebenzayo

Silungiselelwe sithathwa apha:

- Hayes, D., Mills, M., Christie, P. & Lingard, B. (2006) *Teaching and Schooling Making a Difference: Productive Pedagogies, Assessment and Performance*. Crows Nest: Allen & Unwin.
- Killen, R. (2005) *Programming and Assessment for Quality Teaching and Learning*. Southbank Victoria: Thomson.

7.2 IsiHlomelo sesi-2: Ubungakanani befuthe leemeko ekufundeni

Influence	Effect Size	Source of Influence
Feedback	1.13	Teacher
Students' prior cognitive ability	1.04	Student
Instructional quality	1.00	Teacher
Direct instruction	.82	Teacher
Remediation/feedback	.65	Teacher
Students' disposition to learn	.61	Student
Class environment	.56	Teacher
Challenge of Goals	.52	Teacher
Peer tutoring	.50	Teacher
Mastery learning	.50	Teacher
Parent involvement	.46	Home
Homework	.43	Teacher
Teacher Style	.42	Teacher
Questioning	.41	Teacher
Peer effects	.38	Peers
Advance organisers	.37	Teacher
Simulation & games	.34	Teacher
Computer-assisted instruction	.31	Teacher
Testing	.30	Teacher
Instructional media	.30	Teacher
Aims & policy of the school	.24	School
Affective attributes of students	.24	Student
Physical attributes of students	.21	Student
Programmed instruction	.18	Teacher
Ability grouping	.18	School
Audio-visual aids	.16	Teacher
Individualisation	.14	Teacher
Finances/money	.12	School
Behavioural objectives	.12	Teacher
Team teaching	.06	Teacher
Physical attributes (e.g., class size)	-.05	School
Television	-.12	Home
Retention	-.15	School

Silungiselelwe sithathwa apha: Hattie, J. (2012) *Visible Learning for Teachers: Maximizing impact on learning*. London: Routledge.