

SiSwati

Tintfo letibalulekile tebudlelwane beMmango waseNingizimu Afrika neSayensi: Imiphumela Yeluhlolo Lwa-2022



science, technology
& innovation

Department:
Science, Technology and Innovation
REPUBLIC OF SOUTH AFRICA



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Lemibiko ingalandvwa mahhala kuletikhonjiso letilandzelako letiya ku-DSI naku-HSRC



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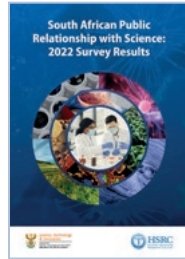
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Ikhicitwe nguMkhandlu Welucwaningo Lwesayensi Yebantfu (i-HSRC) egameni leLitiko Letesayensi Nekusungula (i-DSI).

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Kucaphuna lombiko:

Litiko Letesayensi Nekusungula (2024) Tintfo Letibalulekile Tebudlelwane Bemango waseNingizimu Afrika neSayensi: Imiphumela Yeluhlolo lwa-2022. Ilungiselelwe nguMkhandlu Welucwaningo Lwesayensi Yebantfu weLitiko Letesayensi Nekusungula. ePitoli: i-HSRC.



Lombiko we-Highlights usekelwe embikweni lophelele:

Litiko Letesayensi Nekusungula (2024) Budlelwane Bemango WaseNingizimu Afrika Nesayensi: Imiphumela Yeluhlolo lwa-2022. Ilungiselelwe nguMkhandlu Welucwaningo Lwesayensi Yebantfu weLitiko Letesayensi Nekusungula. Pitoli: i-HSRC

Inombolo Yemtsetfomgomo Yekomidi Yekutiphatsa REC/Kuvuselelwa kweNchubomgomo Nombolo REC 5/17/08/11: Luhlole Lwesimo Sengcondvo Setenhlalakahle saseNingizimu Afrika (i-SASAS) 2019.

Budlelwane Bemango Nesayensi YaseNingizimu Afrika (i-SAPRS): Imiphumela Yeluhlolo lwa-2022 ngumvuthwandaba wemsebenti weminyaka lengetulu kwalemine lofaka ekhatsi kwenta umcondvo walolucwaningo, kutfutukisa tintfo tekusebenta, kuhlangukisa lwati, kuhlatiya lwati, kanye nekubhala umbiko.

Bekukubambisana emkhatsini weLuphiko Lwekukhutsata Isayensi eLitiko Letesayensi Nekusungula kanye neLuhlelo Lwelucwaningo Lwemfundvo Lelinganako Netemnotfo (i-EEE) eMkhandlwini Welucwaningo Lwesayensi Yebantfu. Lelicembu le-DSI beliholwa nguMnumzane Isaac Ramovha kantsi licembu lelucwaningo le-HSRC beliholwa nguDkt Vijay Reddy.

Kuleminyaka lemine, emalunga elicembu lelucwaningo lamcoka bekunguDkt Vijay Reddy, Dkt Benjamin Roberts, Nksz Sylvia Hannan, kanye naDkt Steven Gordon.



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1 Singeniso

Lwati lwesayensi luphakamisa kucondza kwetfu umhlaba, tsine, kanye nekuba khona kwetfu. Kukhona kuvumelana lokukhulu kwekutsi imigomo yesayensi kufanele kutsi idlule ngetulu kwemitselela yetemnotfo netebucwepheshe, kute kulungiswe tinsayeya temhlaba wonkhe netendzawo tesikhatsi lesiphila kuso letitsintsa ngalokucondzile timphilo tetfu. Kusukela emalangeneni awo ekucala, umbuso waseNingizimu Afrika wentsandvo yelinyenti wabona kubaluleka kwebudlelwane emkhatsini wemmango nesayensi, nekutsi bonkhe bantfu baseNingizimu Afrika kufanele kutsi bahlanganyele ekugucukeni kweLuhlalo Lwavelonkhe Lwekusungula (i-NSI).

Litiko Letesayensi Nekusungula, kanye nebalngani balo, linesibopho sekukhutsata kutibandzakanya kwesayensi ngaphakatsi kwe-NSI. Liphepha Lelimhlophe lakamuva leSayensi, Tebucwepheshe Nekusungula (i-STI) lakhiwe etinyatselweni tangembali ngekutsi kukhutsatwe ummango lofundza isayensi futsi lowati isayensi, kanye nekugcila kabusha kusayensi – kuhlanganiswa kwemmango (i-DST 2019a). Kuhlola inchubekelebili lebhokisiwe ekuzuzeni ummango lofunwako lofundza ngesayensi futsi lowati isayensi, i-DSI yacala yasungula isethi yetinkhomba tekukala kusebenta kwekubandzakanyeka kwesayensi eluhlelweni lonkhe. Kwesibili, yamukele luhlu lwetinkhomba letincane tekwatisa luhlalo lwetikhatsi letitsite lwemmango waseNingizimu Afrika lomdzala kute kukalwe futsi kugadvwe emazinga elwati lwesayensi, imibono, kanye nekutibandzakanya.

Tinhlelo tekubandzakanyeka kwesayensi kanye nekukala budlelwane emkhatsini wemmango nesayensi kwasungulwa ngekusebentisa tinchubomgomo letinyenti

kanye nemasu, lokunguLisu Lekubandzakanyeka Kwesayensi (DST, 2015), Liphepha Lelimhlophe Letesayensi, Tebucwepheshe Nekusungula (DST, 2019a), Kugadza Kubandzakanyeka Kwesayensib well, ESTD as9). Luhlaka Lwetinkhomba Temtselela Wekugadza Nekuhlola Kubandzakanyeka Kwesayensi (i-DST, 2021).

Luhlalo lwekucala loluphelele loluhloselwe kukala nekugadza emazinga emmango elwati lwesayensi, imibono, kanye nekutibandzakanya kwentiwa nga-2022. Loluhlalo lutawuphindzaphindwa njalo ngemuva kweminyaka lesihlanu. Umbiko lophelele – [Luhlalo Lwebudlelwane Bemmango Nesayensi YaseNingizimu Afrika: Imiphumela Ya-2022 \(i-DSI, 2024\)](#) – sewushicilelwe. Lombiko logcizelelako uchaza kafishane indlela yekufundzela kanye neLuhlaka Lwekugadza Nekuhlola Umtselela Wekubandzakanyeka Kwesayensi (i-SEMEIIF) lolwatisa kwakhiwa kwelwati lwesayensi lolungu-27, imibono, kanye netindlela tekubandzakanyeka. Ngemuva kwaloko, sifingqa imiphumela leyinhloko ngekuchaza emazinga (emaphuzu lasemkhatsini) etilinganisweni letehlukahlukene, kanye nekuhlukahluka kwemaphuzu esilinganisweni ngasinye. Ngemuva kwaloko, sibika kutsi ngutiphi timphawu tetenhlalakahle-tebantfu lebetingaholela elwatini loluhle lwesayensi, imibono, kanye nekutibandzakanya.

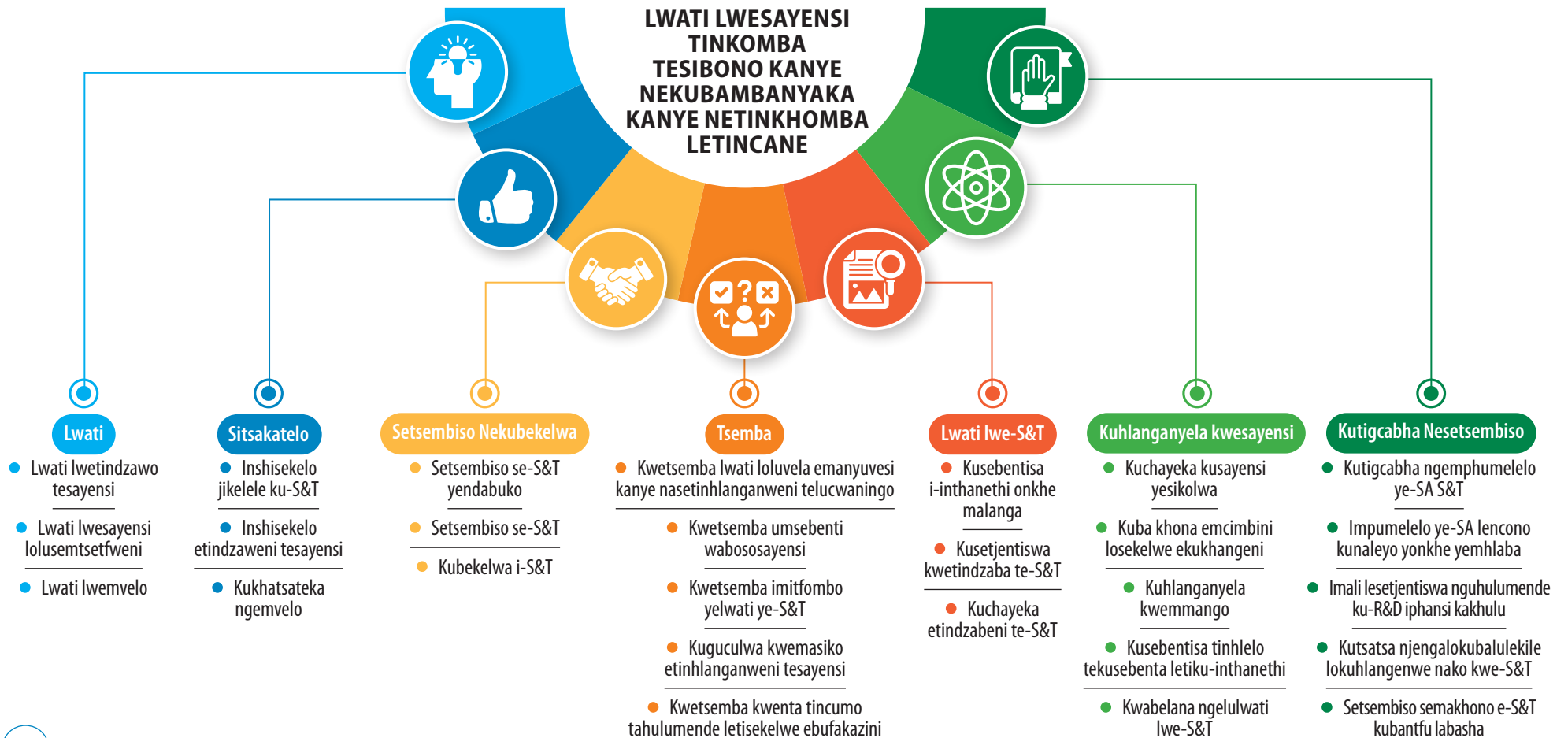
Sibese setfula iminwe yebudlelwane bemmango waseNingizimu Afrika nesayensi sisebentisa emaphuzu lasemkhatsini kanye nekuhlukahluka ngaphakatsi kwetilinganiso tesayensi letingu-27 ngasinye. Letilinganiso tibese tihlukaniswa tibe ngulesinye setigaba letine ngekuya ngemaphuzu abo lasemkhatsini kanye nekuhlukahluka kwemaphuzu. Siphetsa ngekufingqa imiphumela kanye netincomo.

2 Indlela yekufundzela

Sampula/Linani Lebantfu	Isampula lemele bantfu labadzala bakavelonkhe labaneminyaka lengu-16 kuya etulu, labakhetsiwe etindzaweni letingu-500 etifundzeni letiyimfica.
Usayizi wesampula	5 960 labaphendvulile kusampula yavelonkhe.
Lithulusi leluhlolo kanye neluhlaka lwekubika	Luhlaka Lwetinkhomba Temtselela Wekugadza Nekuhlola Kubandzakanyeka Kwesayensi lwatisa ngekutfutukiswa kwelithuluzi leluhlolo njenge.
Tinkhulumomphendvulwano teluhlolo	Emkhatsini waNovember 2022 naJanuary 2023, kwentiwa tinkhulumomphendvulwano teli-awa linye buso nebuso nebantfu labadzala labaneminyaka lengu-16 kuya etulu. Letinkhulumiswano takhiwe ngalunye lwetilwimi letisemtsetfweni letingu-11, ngekuya ngekutsi labaphendvulile bakhetsani.
Kubamba lwati	Kusetjentiswa indlela yekucocisana nemuntfu ngekusitwa yikhompyutha (i-CAPI), lwati lwabanjwa kumsiti wemuntfu wedijithali (PDA).
Kulinganisa idatha	Yonkhe idatha yalinganiswa kubantfu labaneminyaka lengu-16 budzala kuya etulu.
Kubika imiphumela	Imiphumela lebalulekile ngekwetibalo esigabeni sekwetsemba se-95% iyabikwa.
Tintfo letigucukako tetenhlalakahle-tebantfu	Iminyaka, bulili, lizinga lekutfolela imfundvo, kusekelwa ngemfundvo yasekhaya lokuniketwa batali nalabanye bantfu labadzala (kufundza lokusekelako, umsebenti wasekhaya njll), simo setenhlalakahle-temnotfo lesisekelwe enkombeni yemphahla, simo semakethe yemisebenti, indzawo yekuhlala, tinkholelo tenkholo, kanye nelicembu lebantfu kwasetjentiswa. Sibita leti ngekutsi ngemacembu lamancane.
Lelibito lelitsi 'sayensi' lisho	Kukhucita lwati etifundvweni tetifundvo: isayensi yemvelo neyekuphila, bunjinnyela, isayensi yetenhlalakahle, kanye nebantfu.
Lelibito lelitsi 'mmango' lingumunye futsi liningi	Kukhona 'mmango' lomnyenti eNingizimu Afrika ngekuya ngesimo lesehlukahlukene semmango. Ngaleyo ndlela, ligama lelitsi 'mmango' lifaka ekhatsi kokubili ummango munye kanye nebantfu labanyenti.
Sisebentisa idatha lelikwe ngekutibika	Idatha yabutfwa ngemibuto yeluhlolo lapho khona bahlanganyeli baniketa timphendvulo tabo ngekwemtimba ngaphandle kwekucinisekiswa kwangaphandle.
Emaphuzu lasemkhatsini	Emaphuzu ekwakha intfo yinye naletinyenti aguculwa aba sikali se-0–100. Emaphuzu lasemkhatsini abalwa futsi abikwa kulabo labangu-100.
Kuhlukahluke kwemaphuzu	Umehluko emkhatsini wemaphuzu laphakeme nalaphansi lasemkhatsini, ngemacembu lamancane.

3 Luhlaka Lwetinkhomba Temtselela Wekugadza Nekuhlola Kubandzakanyeka Kwesayensi

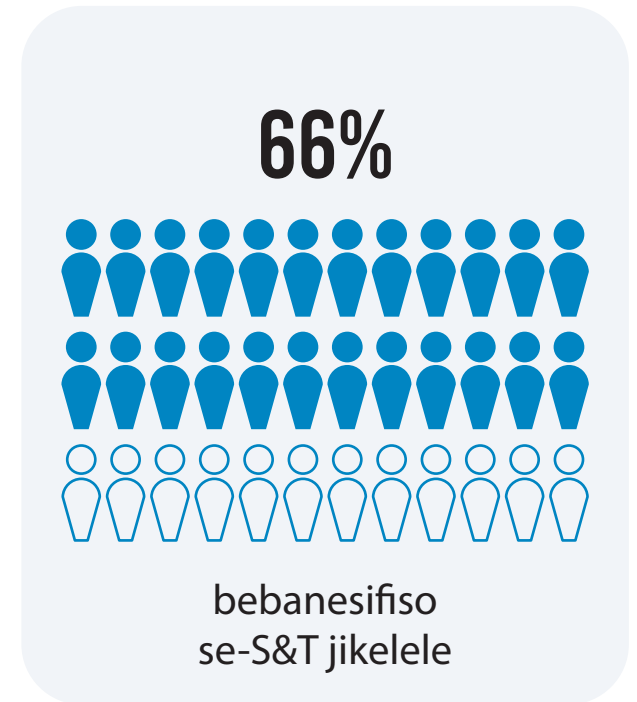
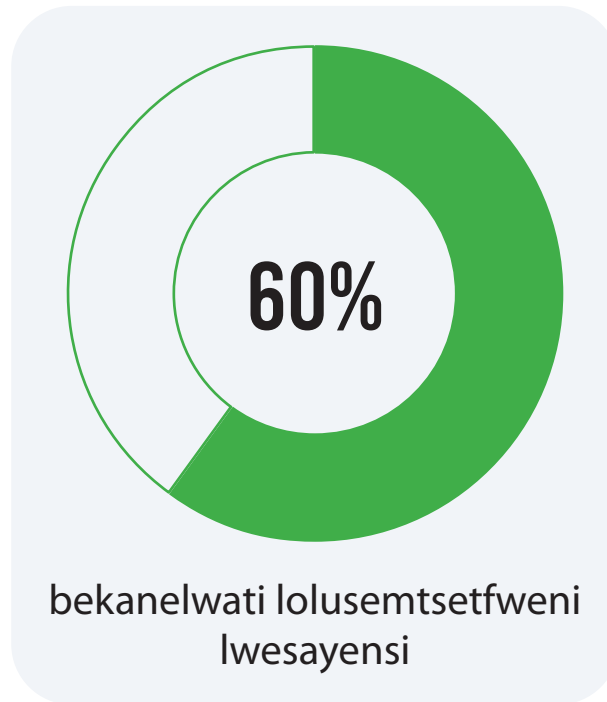
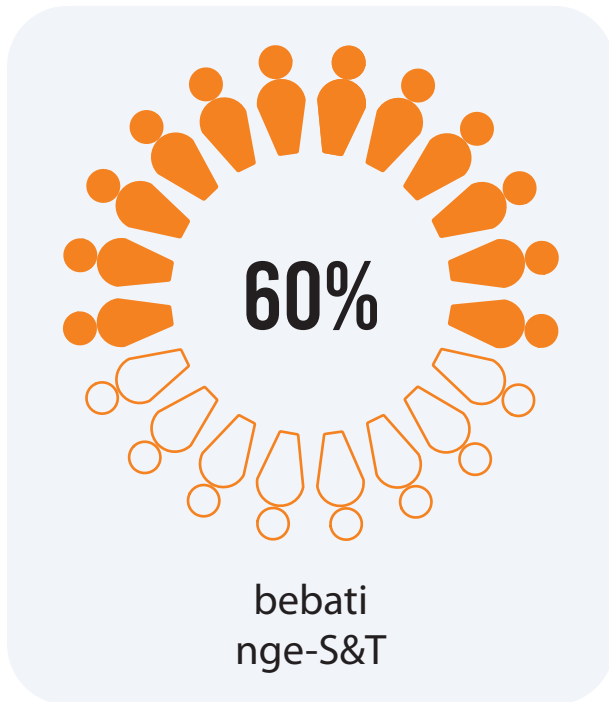
I-SEMEIIF yahllelwa kabusha kancane kutsi ifake ekhatsi tinkhomba letisikhombisa noma tingcikitsi temtselela kanye netinkhomba letincane letingu-27 noma tinyatselo temtselela. Letinkhomba bekwati lwesayensi netebucwepheshe (S&T) kanye nenshisekelo; setsembiso kanye nekugodla kanye nesimo sengcondvo sekwetsemba; Lwati lwe-S&T; kanye nemiphumela yekutibandzakanya kwesayensi, kufaka ekhatsi imibono lephatselene nekutigcabha kanye nesetsembiso se-S&T. Kukala kanye nekusebentisa inkomba ngayinye noma ingcikitsi yemtselela, sikhombe emkhatsini wetinyatselo temtselela letintsatfu nalesihlanu. Etincenyeni letilandzelako, sibika imiphumela leyinhloko yetinyatselo ngasinye temtselela. Kute utfole leminye imininingwane ngemiphumela sicela ubheke **umbiko lomkhulu**.



4 Kucaphela kwemmango kanye nelwati kanye nenshisekelo kusayensi netebucwepheshe

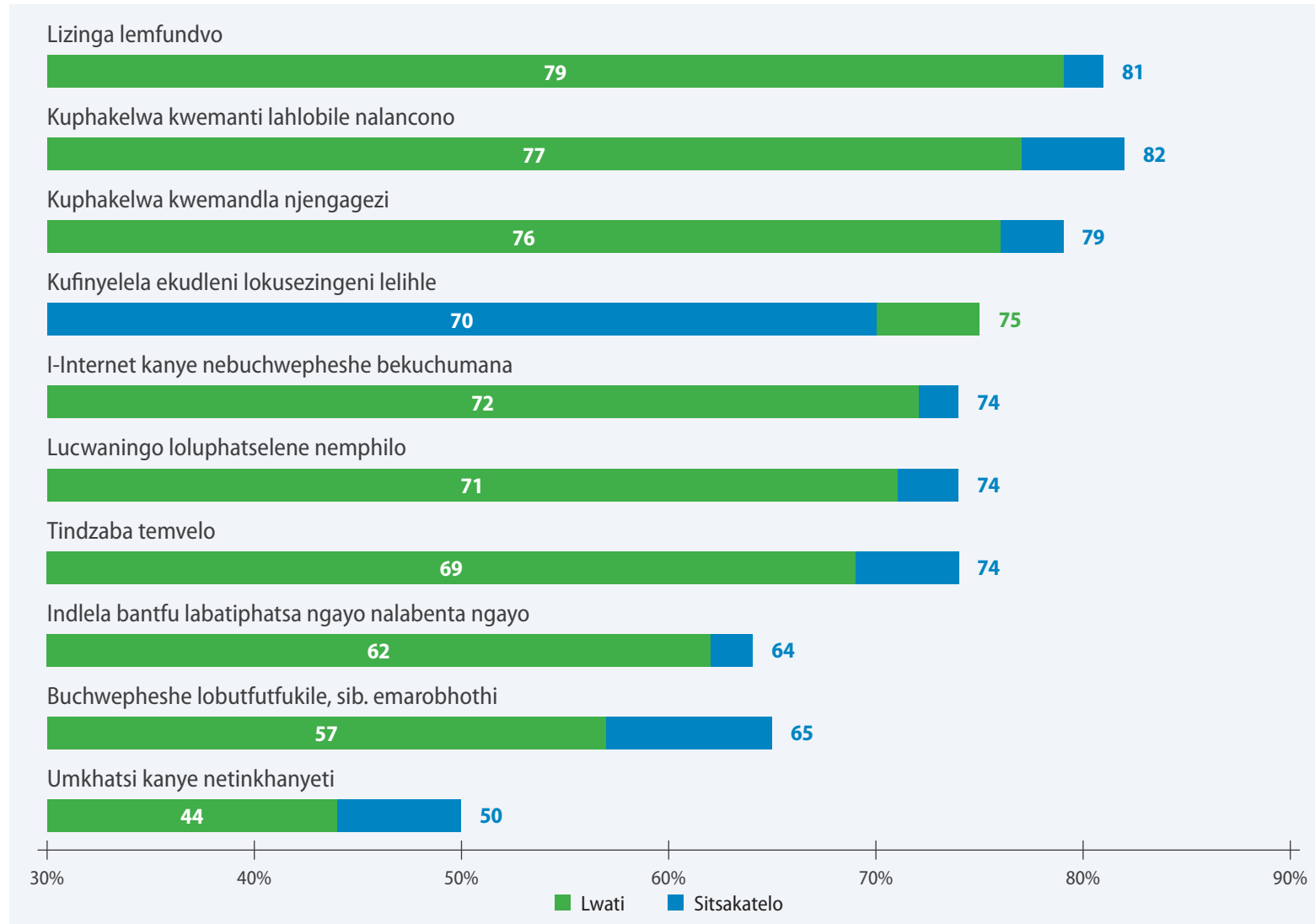
Kucaphela kanye nelwati kanye nenshisekelo ku-S&T kuniketa lwati ngesimo sebudlelwane emkhatsini wemmango nesayensi. Ngekutsandza, sisho kufuna kwati kabanti, lwati lusho lwati loluvelo lunalo, kantsi kucaphela kukhombisa kwatiswa, noma kungasho ngekuvisisa.

Ummango waphendvula ngekwehlukana mayelana nemazinga abo enshisekelo, lwati, kanye nekucaphela i-S&T. Sekukonkhe, bantfu baseNingizimu Afrika bayati kahle, banelwati futsi banenshisekelo ku-S&T.



4.1 Liphesenti lebantfu labadzala lokungenani labanelwati lolutsite kanye nenshisekelo etindzaweni tesayensi letibalulekile

Ngetulu kwaloko, sihlole lwati lwemmango kanye nenshisekelo etinsayeya temmango tesikhatsi lesiphila kuso letidzinga imphendvulo ye-S&T.



LIZINGA LELIPHAKAMILE LELWATI

Lizinga lemfundvo

79%



LIZINGA LELIPHAKAMILE LENTSANDVO

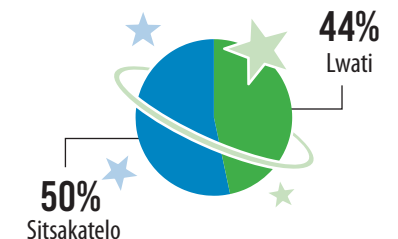
Kuphakelwa kwemanti lahlobile nalancono

82%



EMAZINGA LAPHANSI KAKHULU ELWATI KANYE NEKUTSANDLELA

Umkhatsi kanye netinkhanyeti



4.2 Emaphuzu lasemkhatsini elwati kanye nenshisekelo ku-S&T, letfulwa kuwo onkhe emacembu lamancane lehlukene



Ngubani lobekanelwati loluphakeme kanye nenshisekelo ku-S&T?

Bekunekuhluka lokukhulu kwemaphuzu kuwo onkhe emacembu lamancane, ngemaphuzu lasemkhatsini elwati lwesayensi kusuka ku-46 kuya ku-71 ku-100, kanye nenshisekelo yesayensi kusuka ku-53 kuya ku-75 ku-100.

Labo labanelwati loluphakeme lwesayensi kanye nenshisekelo:

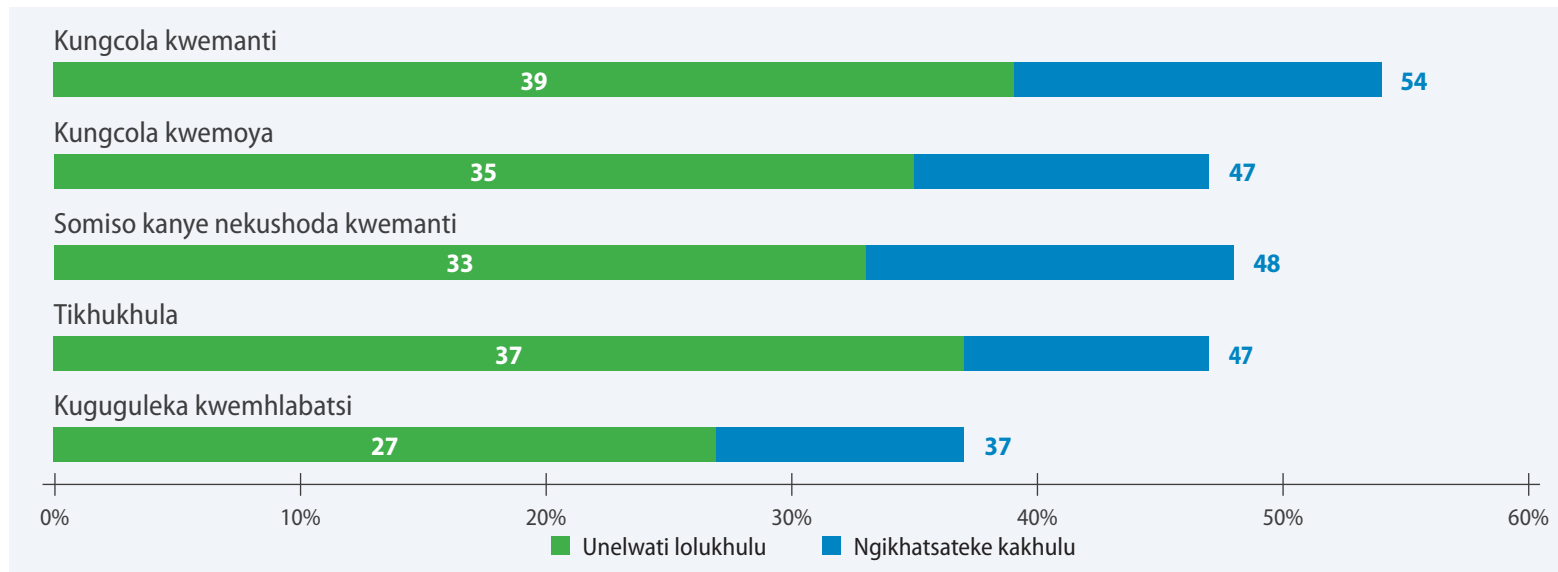
- bebancane,
- bekatfole imfundvo lelandzelako,
- bekaLangabetene nekusekelwa ngemfundvo lephakeme yasekhaya, futsi
- bebavela emakhaya lanesimo lesiphakeme setenhlalakahle netemnotfo (SES).

Labadzala labamhlophe naseNdiya/Asia bebanelwati loluphakeme lwe S&T; ngesikhatsi bantfu labadzala labaMhlophe, labaMnyama base-Afrika, kanye nebantfu baseNdiya/base-Asia bebanesitsakatelo lesiphakeme.

5 Lwati lwemmango kanye nekukhatsateka ngetintfo letenteka endzaweni

Imitselela yekushintja kwesimo selitulu kanye netigameko letimbi temvelo kuyintfo lekhatasato yemhlaba wonkhe kanye naseNingizimu Afrika. Labadzala labanyenti babike kutshi 'bakhatsateke kakhulu' ngaletintfo letenteka endzaweni kunekuba 'nelwati lolukhulu' ngaletintfo letenteka.

Liphesenti lebantfu labadzala 'labanelwati lolukhulu' futshi 'labakhatsateke kakhulu' ngetintfo letenteka endzaweni



3 kubo bonkhe bantfu labadzala laba-4

bebanelwati lolutsite lokungenani kanye nekukhatsateka ngetintfo letenteka endzaweni



LWATI LOLUPHAKAMILE NEKUKHATSATEKA Tigameko temvelo

47% Kukhatsateka

34% Lwati



Timpawu talabo labanelwati loluphakeme kanye nekukhatsateka ngetintfo letenteka endzaweni

- Emaphuzu lasemkhatsini, ngemacembu lamancane, abesemkhatsini wa-56 na-74 (ku-100) welwati lwemvelo, futshi abesemkhatsini wa-62 na-83 wekukhatsateka ngemvelo.
- Bantfu labadzala lebebanelwati lolukhulu futshi labakhatsateke ngetintfo letenteka endzaweni:
 - bekanemfundvo lengemuva kwesekondari, futshi abe nekusekelwa ngemfundvo lephakeme yasekhaya,
 - bebavela emakhaya lanjingile e-SES, futshi
 - bekahlala etindzaweni letisemtsetfweni tasemadolobheni nasemaphandleni.
- Bantfu labadzala labamhlophe kanye nemaNdiya/ema-Asia bebanelwati loluphakeme ngetintfo letenteka endzaweni kantsi bantfu labadzala labaMhlophe, labaMnyama base-Afrika, kanye nemaNdiya/ema-Asia bebanekukhatsateka lokusetulu ngetintfo letenteka endzaweni.

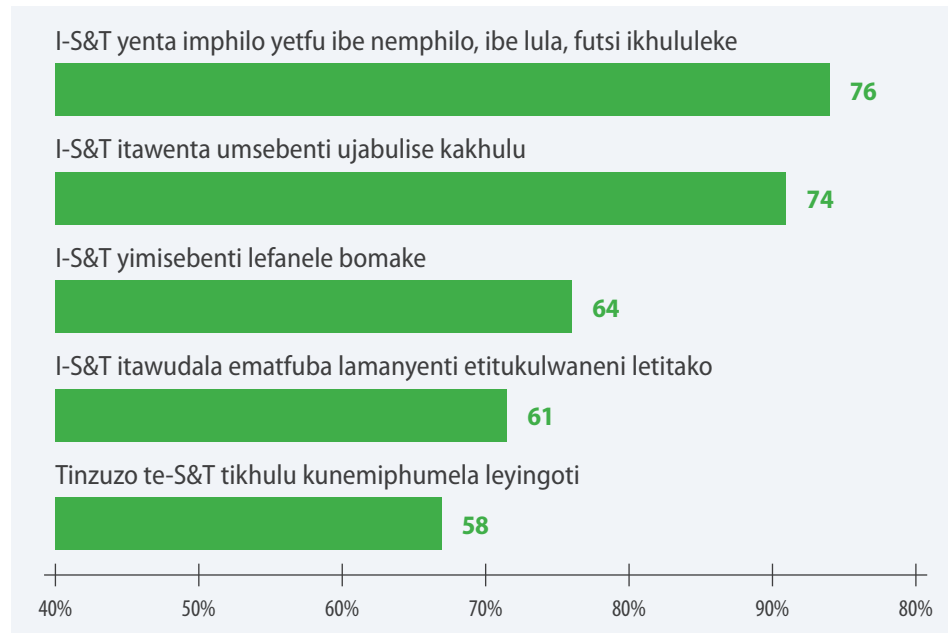
6 Setsembiso kanye nekubekelwa simo sengcondvo mayelana ne-S&T yesimanje neyendabuko

Ummango waphendvula emasethi etintfo lebetibuta ngesimo sabo sengcondvo sesetsembiso (tinzuzo letingaba khona) kanye nekugodla (kukhatsateka, kwesaba, kanye nebungoti) lokuhlobene nesayensi yesimanje kanye neyendabuko. Ummango waseNingizimu Afrika uvumile kokubili tsetsembiso kanye nekukhatsateka mayelana ne-S&T.

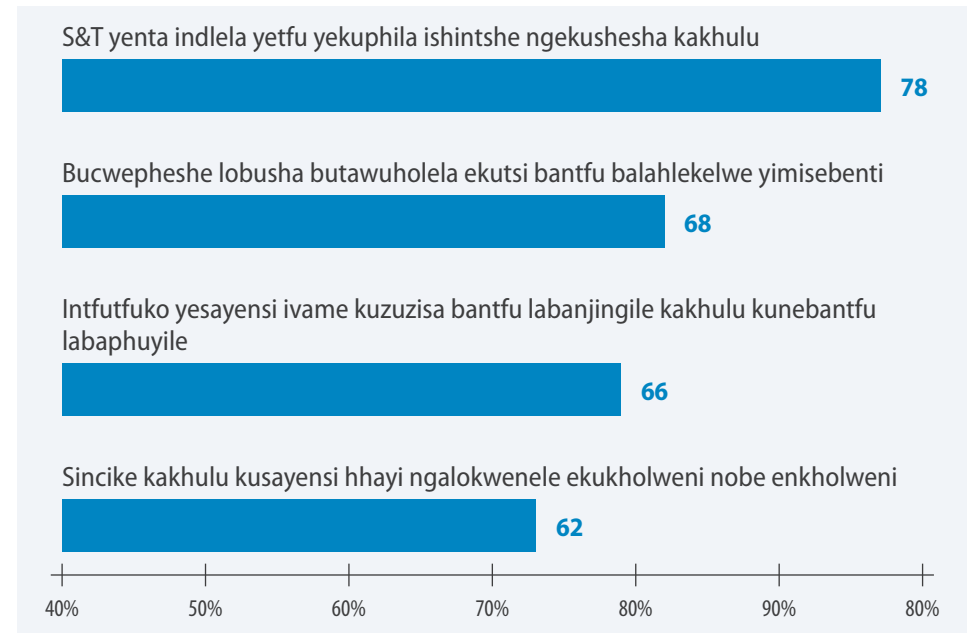
6.1 Setsembiso kanye nesimo sengcondvo sekubekelwa eceleni kwe-S&T yesimanje

Tinzuzo letinkhulu letingaba khona letibikwe betiphatselene ne-S&T kwenta imphilo yemalanga onkhe ibe nemphilo, ibe lula, ikhululeke kakhulu futsi yente umsebenti ujabulise kakhulu; ngesikhatsi kukhatsateka lokukhulu lokuphawulwe bekumayelana ne-S&T kwenta indlela yetfu yekuphila ishintje ngekushesha lokukhulu futsi ifake sandla ekwenyukeni kwekungalingani.

Setsembiso sesayensi yesimanje (% sivumelwano)



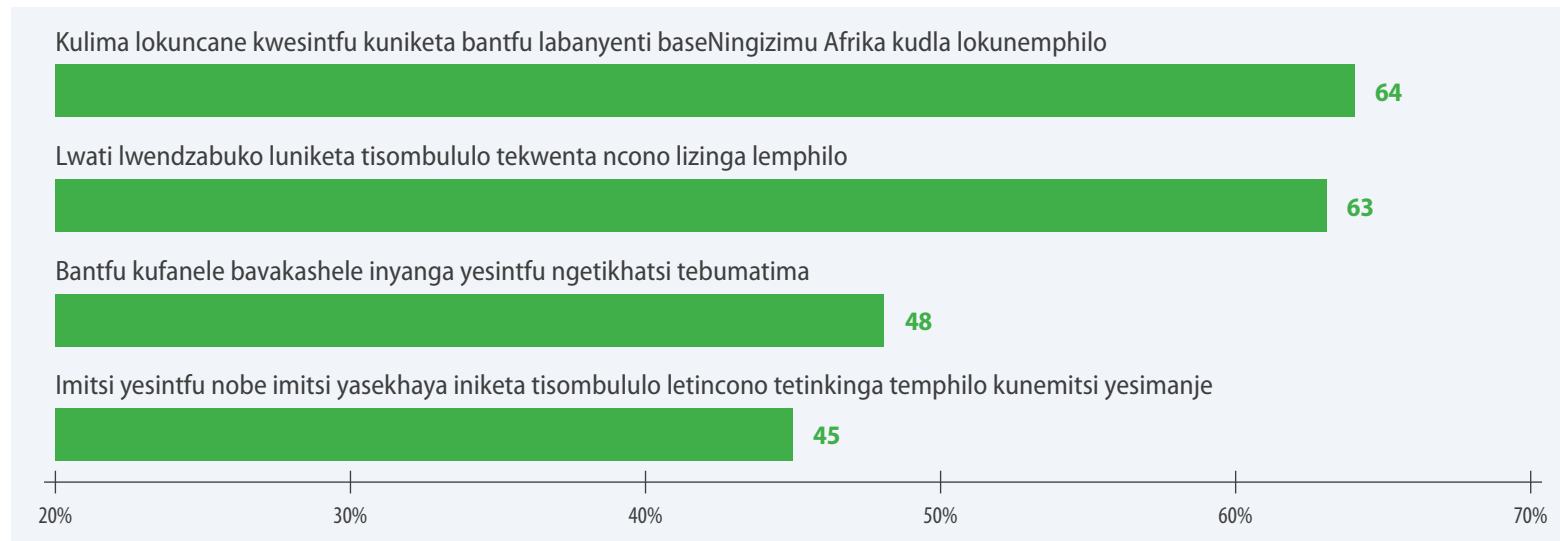
Kugodla mayelana nesayensi yesimanje (% sivumelwano)



6.2 Setsembiso kanye nesimo sengcondvo sekubekelwa eceleni mayelana ne-S&T yendabuko

Isayensi yendabuko ibhekisela elwatini nemakhono ladluliselwe esitukulwaneni kuya esitukulwaneni ngaphakatsi kwemango.

Setsembiso sesayensi yendabuko (% sivumelwano)



2 kubantfu labadzala laba-3

bavume tinzuzo tekulima lokuncane kwesintfu kanye nelwati lwesintfu ekukhiciteni kudla

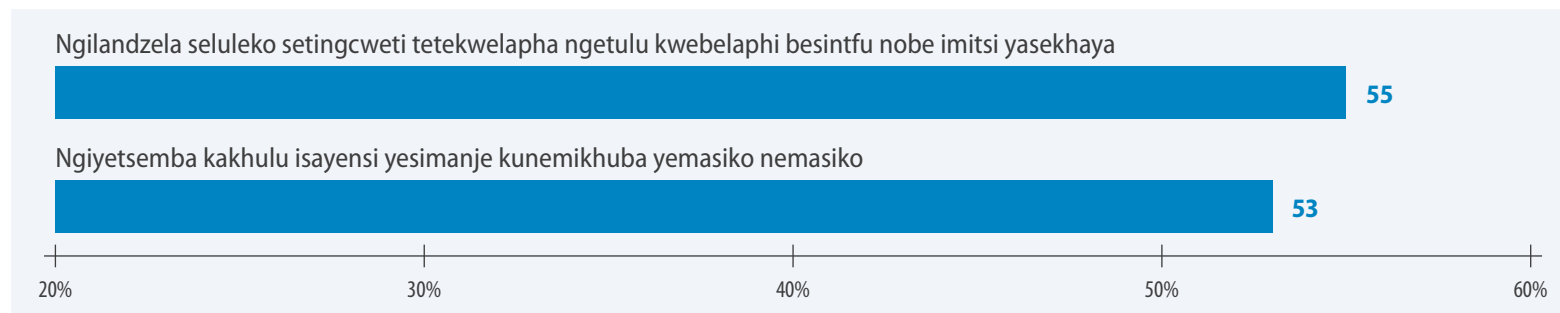


5 kubantfu labadzala laba-10

bayibona indzima yebelaphi besintfu kanye nemitsi yesintfu

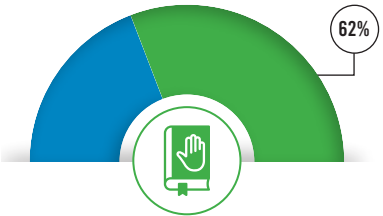
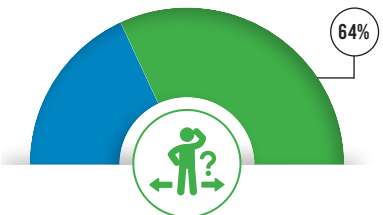
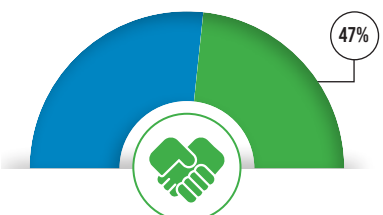


Kugodlwa mayelana nesayensi yendabuko nga-2022 (% sivumelwano)



6.3 Kusabalaliswa kwesimo sengcondvo sesetsembiso nekugodla kanye nekutsi ngubani lobekanesimo sengcondvo sesetsembiso kanye nekugodla lesiphakeme

Bekunesetsembiso lesiphakeme kanye nesimo sengcondvo sekugodla kusayensi yesimanje kunesayensi yendabuko. Ngetulu kwaloko, bekunekuhluka lokuncane emkhatsini wesimo setsembiso semmango kanye nekugodla (njengobe kukhonjisiwe ngumehluko emkhatsini wemaphuzu laphakeme nalaphansi ngemacembu lamancane) mayelana nesayensi yesimanje kunesayensi yendabuko.

	Emaphesenti ebantfu labadzala labanesimo sengcondvo lesicinile	Lokuphakeme nalokuphansi emaphuzu (nemehluko)	Bobani lebebanematfuba lamakhulu ekubika setsembiso lesiphakeme kanye nesetulu imibono yekugodla?
Setsembiso mayelana nesayensi yesimanje		62 kuya ku 72 = 10 emaphuzu	Bantfu labadzala labanemfundvo lengetulu kwemfundvo lephansi, imfundvo lephakeme yasekhaya kusekelwa, futsi bobani lebebabafundzi nobe bafundzi lebebanesimo sengcondvo lesiphakeme kwesetsembiso.
Kubhukha kuya esikhatsini lesiphila kuso isayensi		64 kuya ku 76 = 12 emaphuzu	Bantfu labadzala labanemfundvo lengetulu kwemfundvo lephansi, imfundvo lephakeme yasekhaya kusekelwa, lebebanecane, kanye nebantfu labadzala labaMnyama base-Afrika naseNdiya/base-Asia bebane simo sengcondvo sekubekelwa eceleni lesiphakeme.
Setsembiso lesibhekiswe ku isayensi yesintfu		49 kuya ku 70 = 21 emaphuzu	Bantfu labadzala labanemfundvo lephansi, labavela emakhaya lahluphekile, Bantfu labadzala labamnyama base-Afrika kanye nalabo lebebakhuluma siVenda, siZulu, nesiXitsonga kubikwe setsembiso lesiphakeme se-S&T yendabuko.

6.4 Imikhuba yesimo setsembiso kanye nekugodla ngekuhamba kwesikhatsi



Kuletinfo letifakwe etinhlohlweni tangembali, sacatsanisa imiphumela nenhlohlombono ye-SAPRS 2022. Ngalokubanti, imiphumela yakhombisa kukhula kwako kokubili kwetsembisa kanye nesimo sengcondvo sekubekelwa eceleni ngekuhamba kwesikhatsi mayelana nesayensi yesimanje, kepha kwehla kwesimo sengcondvo sekwetsembisa kanye nekubekelwa eceleni kusayensi yendabuko.

Lushintjo lolukhulu bekungumbono wemmango wekungalingani lokukhulako ngetimphendvulo tesitatimende lesitsi 'Intfutuko yesayensi ivame kuzuzisa labacebile kakhulu kunalabahluphekile' lekhuphuka ngemaphuzu langemaphesenti langu-17. Kube nekwehla lokuphawulekako kwelinani lemmango lovumile kutsi i-S&T itawudala ematfuba lamanyenti etitukulwaneni letitako. Ngesikhatsi kujabulisa kucaphela kutsi bantfu labanyenti nyalo sebayetsemba kakhulu kokubili isayensi yesimanje kanye nemikhuba yemasiko nemasiko, kunekukhatsateka kutsi. umbono wesetsembiso sekulima lokuncane sewunciphile.

NB: Tinfo letinemtfunti loluhlata tibike kukhula lokukhulu ngekwetibalo kwekubuka kusukela nga-2013 kuya ku-2022, tintfo letinemtfunti lomtfubi atizange tibe netingucuko letibalulekile ngekwetibalo, kantsi leto letinemtfunti we-orenji tibike kwehla lokukhulu ngekwetibalo kwekubuka.

Isayensi yesimanje: Lushintjo kusuka ku-2013 kuya ku-2022 (Emaphuzu emaphesenti)		
Intfutuko yesayensi ivame kuzuzisa bantfu labanjingile kakhulu kunebantfu labaphuyile (R)		+17***
Sincike kakhulu kusayensi hhayi ngalokwenele ekukholweni nobe enkhohlweni (R)		+7***
I-S&T yenta indlela yetfu yekuphila ishintje ngekushesha lokukhulu (R)		+5***
Tinzuzo te-S&T tikhulu kunemiphumela leyingoti (P)		+9***
I-S&T itawenta umsebenzi ujabulise kakhulu (P)		+7***
S&T yenta imphilo yetfu ibe nemphilo, ibe lula, futsi ikhululeke (P)		0
S&T yimisebenzi lefanele bomake (P)		-2
I-S&T itawudala ematfuba lamanyenti etitukulwaneni letitako (P)		-11***

Tinotfo: *** kubalulekile ngekwetibalo ku $p < .001$

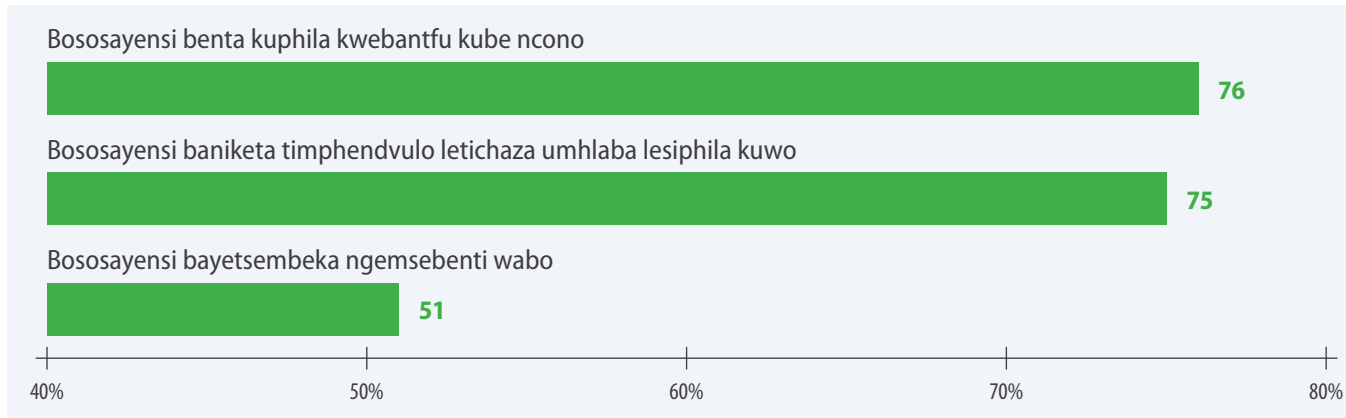
Isayensi yendabuko: Lushintjo kusuka ku-2009 kuya ku-2022 (Emaphuzu emaphesenti)		
Kulima lokuncane kwesintfu kuniketa bantfu baseNingizimu Afrika kudla lokunemphilo (P) -7***		-7***
Ngiyetsemba kakhulu isayensi yesimanje kunemikhuba yemasiko nemasiko (R)		-18***

Tinotfo: *** kubalulekile ngekwetibalo ku $p < .001$

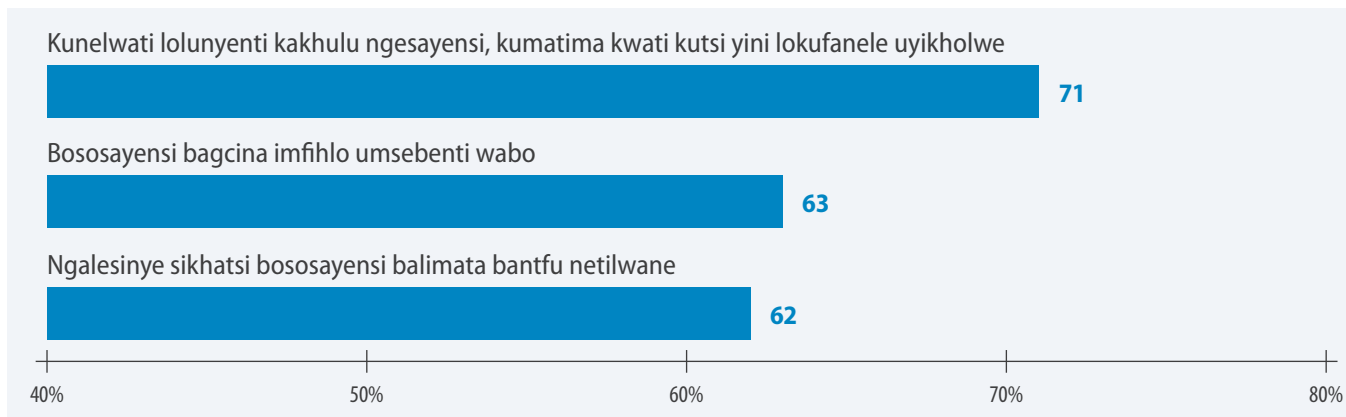
7

Kwetsemba kwemmango emsebentini wabososayensi kanye nelwati lwesayensi loluvela etikhungweni

Setsembiso semsebenti wabososayensi (% sivumelwano)



Kugodla mayelana nemsebenti wabososayensi (% sivumelwano)



Isayensi nabososayensi baniketa lwati lolusekelwe ebufakazini kanye neseluleko sekutsi tinkinga temmango tingacatululwa njani. Kute seluleko semukelwe, ummango udinga kwetsemba isayensi nabososayensi, kanye nekuba nelitsemba etikhungweni letikhicita lwati lolunjalo.

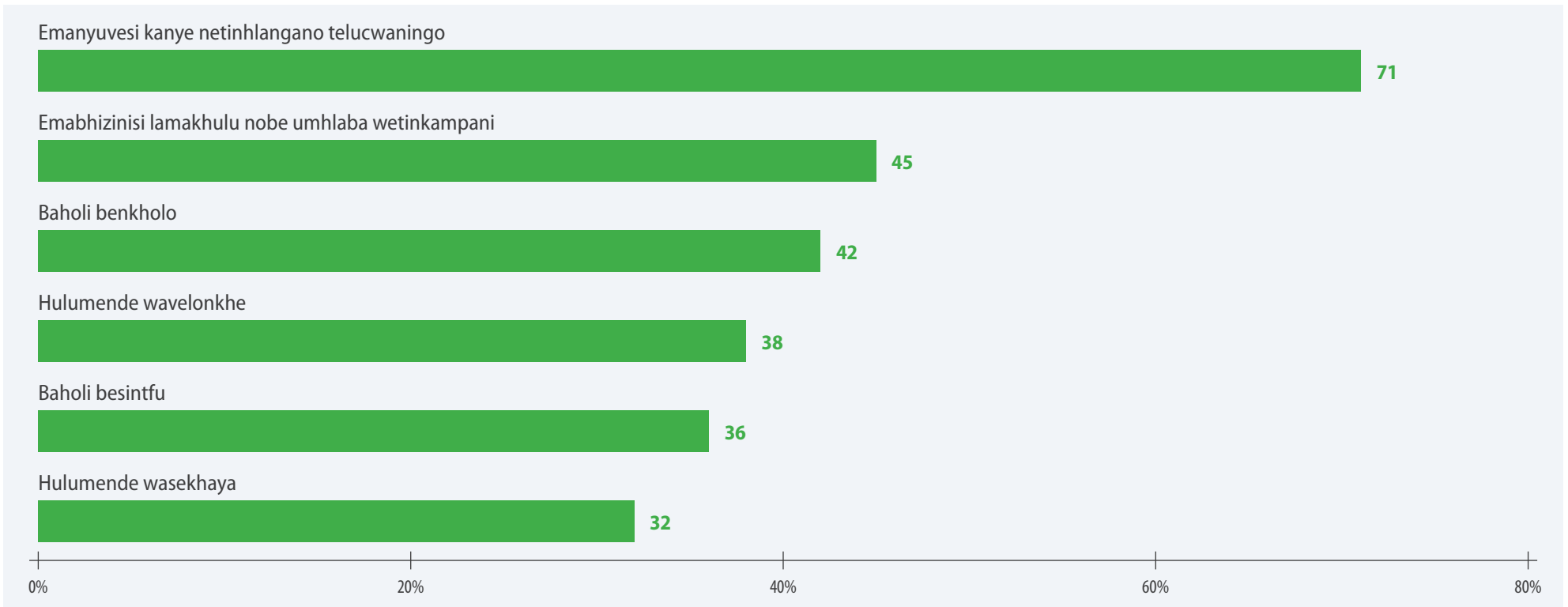


7 kubantfu labadzala labangu-10

bebawetsemba umsebenti wabososayensi, kanye nelwati lwe-S&T loluniketwa ngemanyuvesi kanye netinhlango telucwaningo

Ngesikhatsi lesifanako, nomakunjalo, liphesenti leliphakeme lemmango belinekugodla ngemsebenti wabososayensi kanye nekwetsemba lokuphansi kwelwati lwe-S&T loluvela kubaholi benkholo kanye netikhungo tahulumende (buka likhasi lelilandzelako).

Kwetsemba lwati lwe-S&T loluvela etikhungweni letehlukene (% sivumelwano)



Ngubani lobekatsamba kakhulu bososayensi kanye nelwati lwe-S&T loluvela emanyuvesi kanye nasetinhlango wenzi telucwaningo?

Ummango bewunemibono lefanako, kungakhatsaliseki kutsi bantfu bebahlukahlukene kangakanani, ekwetsembeni kwabo emsebenzini wabososayensi kanye nekwetsemba lwati lwe-S&T loluvela emanyuvesi kanye nasetinhlango wenzi telucwaningo.

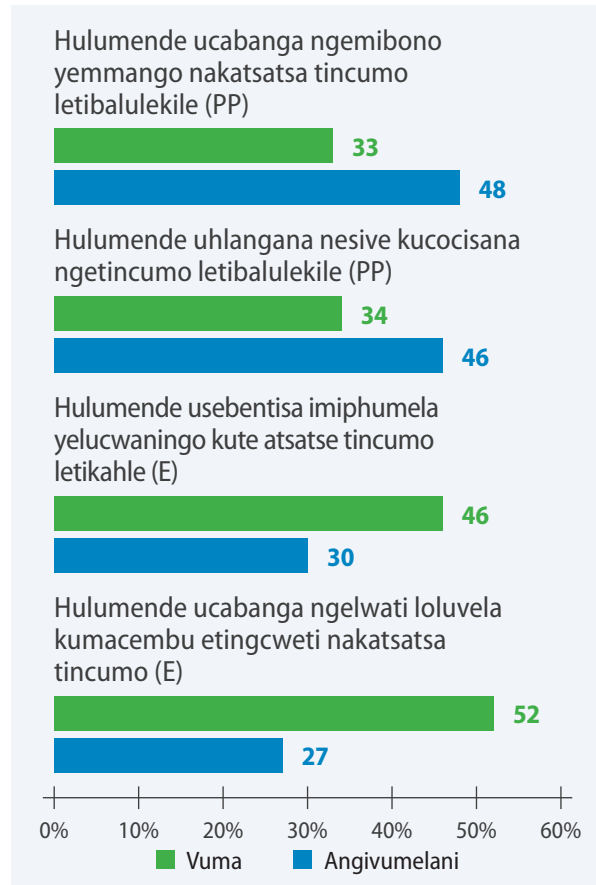
Labo lebebatsemba kakhulu bososayensi kanye nelwati lwe-S&T loluvela emanyuvesi kanye netinhlango telucwaningo bekungu:

- bantfu labadzala labanemfundvo lephakeme,
- bantfu labadzala labanekusekelwa ngemfundvo lephakeme yasekhaya,
- lomncane, futsi
- bafundzi kanye nebefundzi.

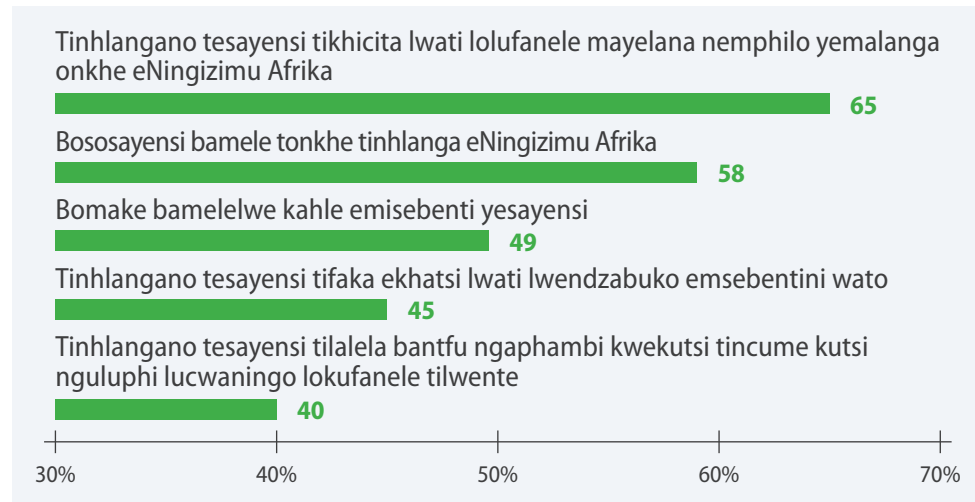
8

Kwetsemba kwemmango etinchubeni tahlumende tekutsatsa tincumo kanye nekuguculwa kwemasiko etinhlanganweni tesayensi

Kwetsemba tinchubo tahlumende letisekelwe ebufakazini (E) kanye nekutsatsa tincumo ngekubamba indzaba (PP) (% kuvumelana nekungavumelani)



Emasiko ngaphakatsi kwetinhlangano tesayensi ayagucuka (% sivumelwano)



3 kubantfu labadzala labangu-10

babike kutsi bametsemba kakhulu hulumende tinchubo tekwenta tincumo



4 kubantfu labadzala labangu-10

bavumile kutsi emasiko lakhona etinhlanganweni tesayensi ayagucuka

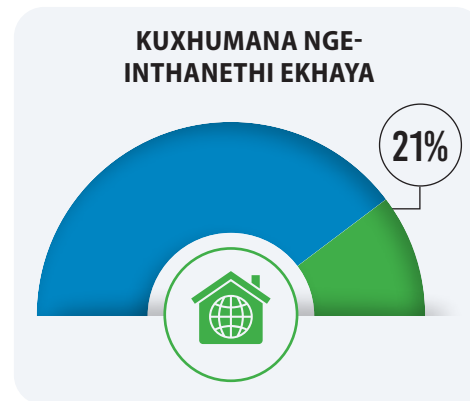
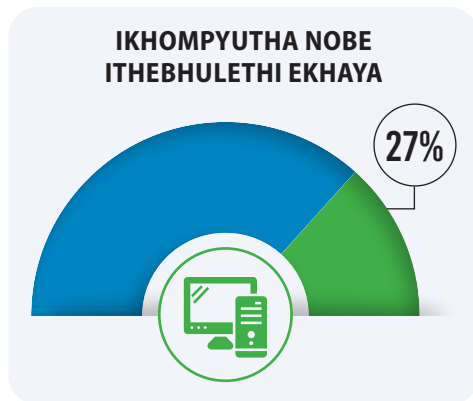
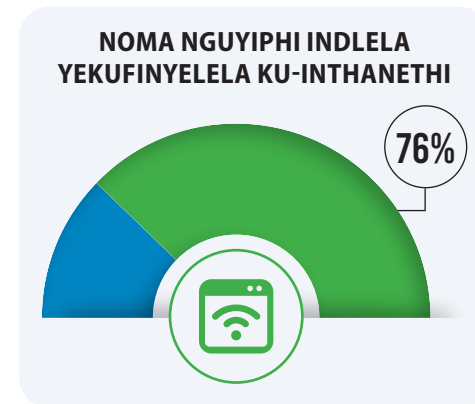
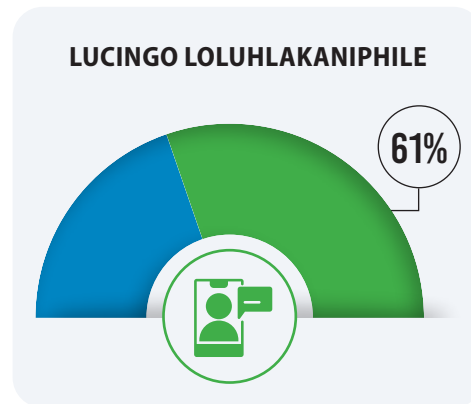
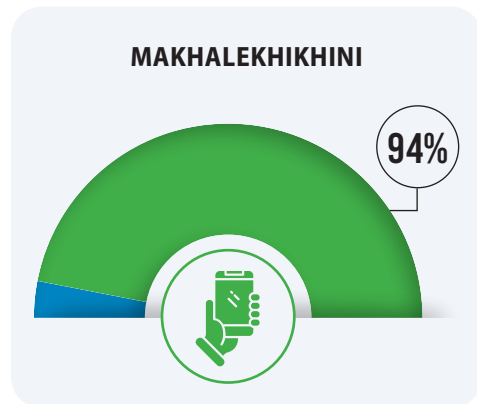


- Bekunekwetsemba lokuphansi etinchubeni tahlumende tekutsatsa tincumo kanye nekuguculwa kwemasiko ngaphakatsi kwetinhlangano tesayensi.
- Umehluko emkhatsini wemaphuzu laphakeme nalaphansi, ngelicembu lelincane, ngekwetsemba tinchubo tekutsatsa tincumo tahlumende bekungemaphuzu langu-11 lamancane; ngesikhatsi umehluko wekuvumelana kutsi emasiko etikhungweni tesayensi ayagucuka kwaba emaphuzu langu-8 lamancane.
- Bantfu baseNingizimu Afrika bavame kwemukela imibono lefanako mayelana nekutsatsa tincumo tahlumende kanye nekugucula emasiko etindzaweni tekusebenta tesayensi, kungakhatsaliseki kutsi bavelaphi.
- Bantfu labadzala labamnyama base-Afrika bebanekwetsemba lokukhulu etinchubeni tahlumende tekutsatsa tincumo kanye nekuvumelana lokusetulu mayelana netingucuko temasiko ngaphakatsi kwetinhlangano tesayensi.

9 Lwati lwe-S&T: Kufinyelela, kuveta, kusetjentswa, kanye nekwetsemba

Budlelwane lobunempilo emkhatsini wesayensi nemmango buncike ekwabelaneni ngelulwati lwe-S&T kanye nekucinisekisa kutsi ummango ungakhona kufinyelela futsi ukwetsembe lolwati. Kufinyelela kwemmango kumadvayisi edijithali kanye ne-inthanethi kudlala indzima lebalulekile ekwenteni kutsi bakhone kutfolwa lwati.

Nga-2022, loku kufinyelela kwedijithali ne-inthanethi bekunjalo:



3 kubantfu laba-4
bebane-inthanethi

6 kubantfu laba-10
bebane-smartphone

9.1 Emaphethini ekufinyelela ku-inthanethi kanye nekuyisebentisa

1 kubantfu labadzala laba-4



bekangenayo i-inthanethi

1 kubantfu labadzala laba-3



basebentisa i-inthanethi njalo (emahora langetulu kwamane emalangenani lamanyenti)

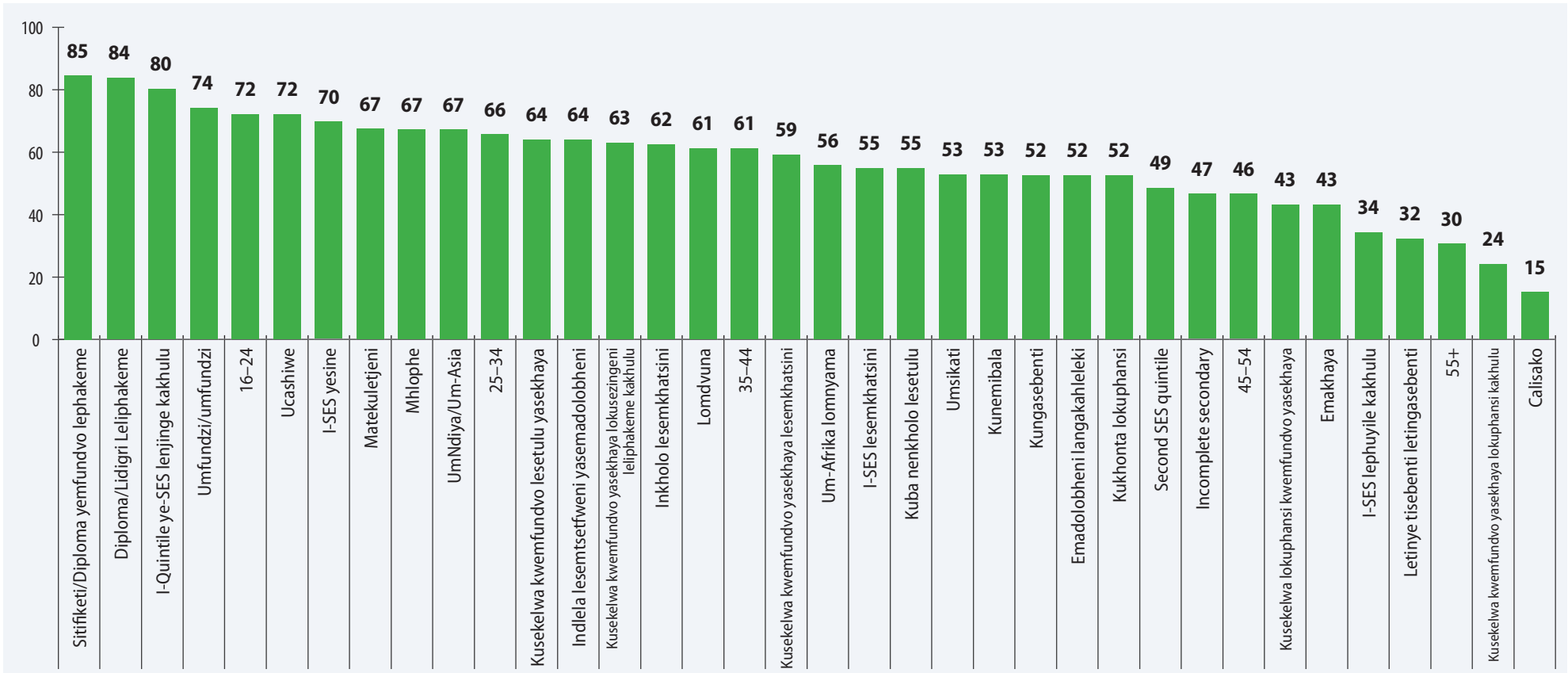
Kusetjentiswa kwe-inthanethi onkhe malanga bekuhlukahluca kakhulu, kusuka ku-85% lephakeme kulabo labanemfundvo lephakeme kuya ku-15% lephansi kulabo labanemfundvo lephansi kuphela.

Ngubani lobekasebentisa kakhulu i-inthanethi?

Labo labasebentisa kakhulu i-inthanethi bekungu:

- bantfu labadzala labanemfundvo lefinyelele kumatikuletjeni kuya etulu, kanye nekwesekelwa ngemfundvo lephakeme yasekhaya,
- lomncane,
- bafundzi, bafundzi, kanye nalabo labacashiwe,
- kusuka emakhaya lanjingile e-SES, kanye
- Bantfu labadzala labamhlophe nalabaseNdiya/base-Asia.

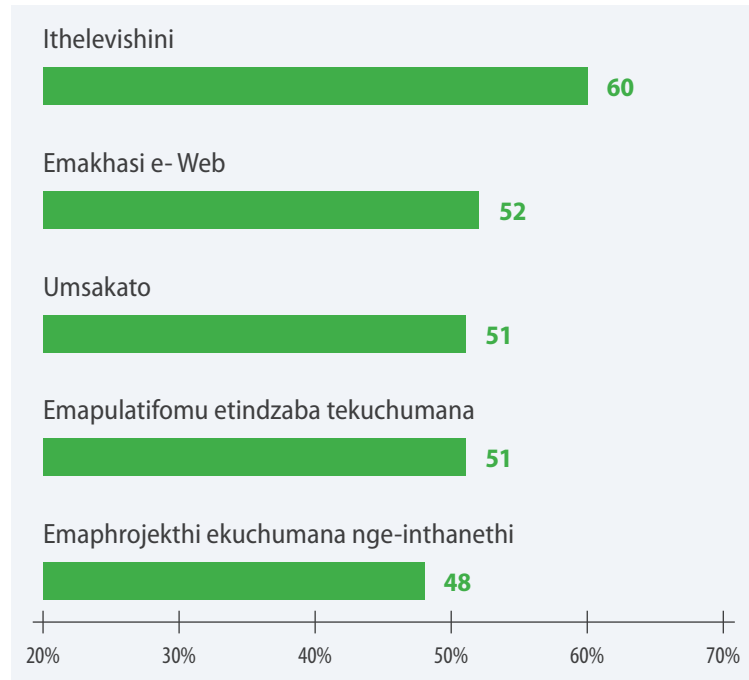
Iphethini yekusetjentiswa kwe-inthanethi onkhe malanga ngetimphawu tetenhlalo-tebantfu (%)



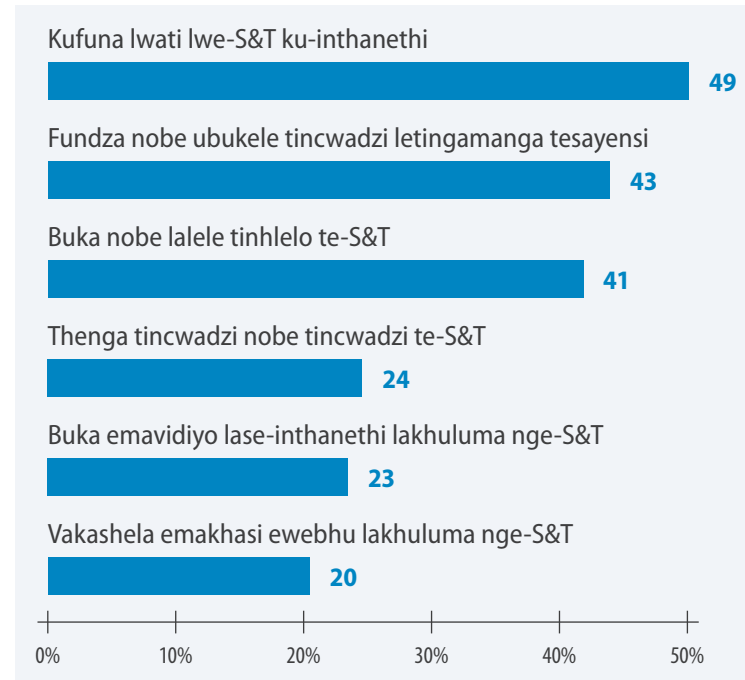
9.2 Kutfola kanye nekusetjentiswa kwemibiko ye-S&T

Imibiko ibalulekile ekwenteni tincumo futsi ingatiphendvulela ngetento netincumo. Ummango utfumela lwati loluncane mayelana ne-S&T (kwemukela) futsi udla (kufinyelela) lwati lwe-S&T.

Imithombo yebhizinisi ye-S&T lethandwa kakhulu (% yesilinganiso senyanga)



Tindlela lethandwa kakhulu etifundvweni te-S&T (% yesikhatsi lesichithwe)



- Bekunemehluko lomkhulu emiphumeleni yekukhuluma nekusebentisa imibiko ye-S&T emkhatsini wemacembu, ngemiphumela lebhawle phansi emkhatsini wemaphutsa langu-22 kuya ku-51 kulangu-100 emibikweni yekukhuluma, kanye na-27 kuya ku-47 ekusebentiseni imibiko.
- Labo labatfole futsi basebentisa lwati lwe-S&T kakhulu:
 - Ube nemfundvo lephakeme,
 - Ube nemazinga laphakeme ekwesekelwa ekhaya,
 - Bebanecane, bafundzi kanye nebafundzi bemsebenti.

2 kubantfu labadzala laba-10

batfole lwati lolunyenti lwe-S&T



1 kubantfu labadzala labangu-20

badla lwati lolunyenti lwe-S&T



UMTSETFO LOTHANDVWE KAKHULU WELWATI LWE-S&T

Ithelevishini

60%



INDLELA LETSANDVWA KAKHULU YEKUFINYELELA LWATI LWE-S&T

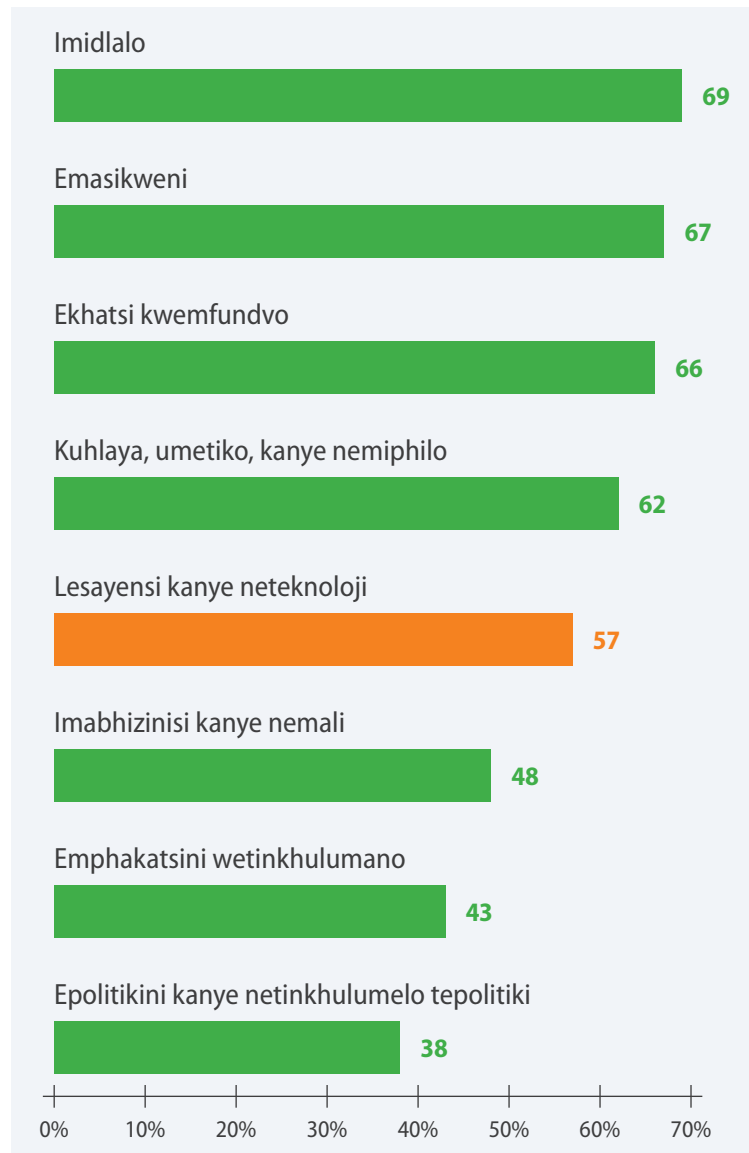
Kusesha ku-inthanethi

49%

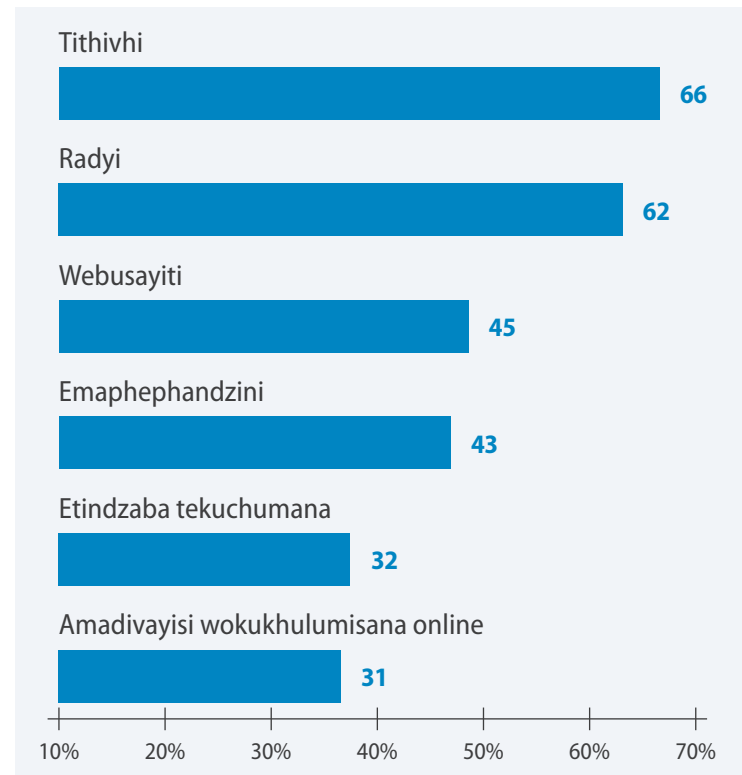


9.3 Kwetsemba Ummango Wetindzaba kanye Nemitfombo Yetindzaba

Ukutsemba Emphakatsini Wemibiko (%)



Ukutsemba Emithonjeni Lemibiko YeS&T (%)



- Kungakhatsaliseki kutsi bavelaphi, bantfu baseNingizimu Afrika bebavame kuba nemazinga lafanako ekwetsemba imithombo yetindzaba ye-S&T.
- Labo lebebatsemba kakhulu imitfombo yetindzaba ye-S&T bekubantfu labadzala labanemfundvo lenyenti, kusekelwa ngemfundvo lephakeme yasekhaya, kanye nalabo lebebanecane, bafundzi, bafundzi, kanye nalabo labangasebenti.

Emaphesenti langu-6 kuya kulangu-10

ebantfu bebajabulile ngendlela ummango lophumelele ngayo ekubikeni imibiko ye-S&T

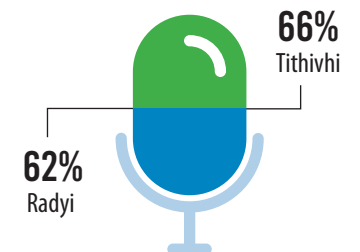


INJONGO YESIKHULU LESIBIKAKO
Imidlalo

69%

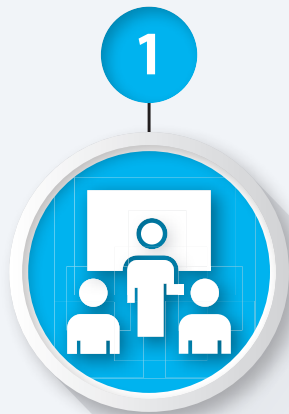


IMITHOMBO LEYESABEKA KAKHULU YEBUHLAKANI BEBUCHWEPHESHE
Ithelevishini kanye neMsakato



10 Imiphumela Yekubambisana Kwesayensi: Imisebenti Netento

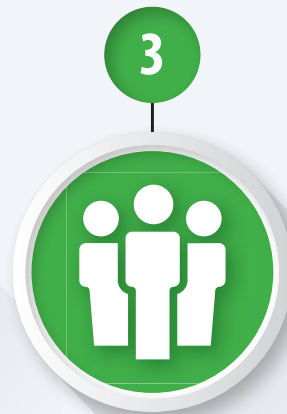
Labaphendvulile kuloluhlobo bacelewa kutsi bahlanganyele njalo emisebentini nobe emicimbini lehambisana ne-S&T, njengobe kwenta kanjalo kuhambisana nekukhombisa tento tabo tekubambisana kutebucwepheshe. Imisebenti noma imicimbi ihlukaniswe yaba tinhlobo letisihlanu letibanti tekubambisana: kubambisana kwemfundvo, kubambisana kwesimo, kubambisana kwemmango, kubambisana kwekwabelana ngelwati, kanye nekubambisana kwemuntfu sicu ngetinhlelo tekusebenta letiku-inthanethi.



1
**KUBAMBANA
NGETIFUNDVO:**
Lizinga lekuchayeka
etifundweni
letisemtsetfweni
tesayensi netibalo
esikolweni lesisetulu
(Emabanga 10–12).



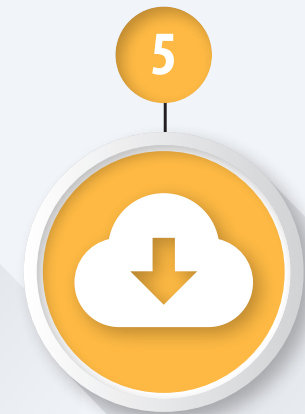
2
**KUBAMBANA
NGESIKHATSI
SEKUNIKELA:**
Kutfolakala kanye
nekuba khona
etindzaweni te-
S&T, imisebenti
noma imicimbi.



3
**KUBAMBANA
KWEMAVE
EMHLABA:**
Kuhlanganyela
emisebenti
yesayensi
yekutfutukisa
imimango.



4
**KWABELANA
NGELWATI:**
Tindlela
tekwabelana
ngelwati lwesayensi
netebucwepheshe
emkhatsini
webantfu.

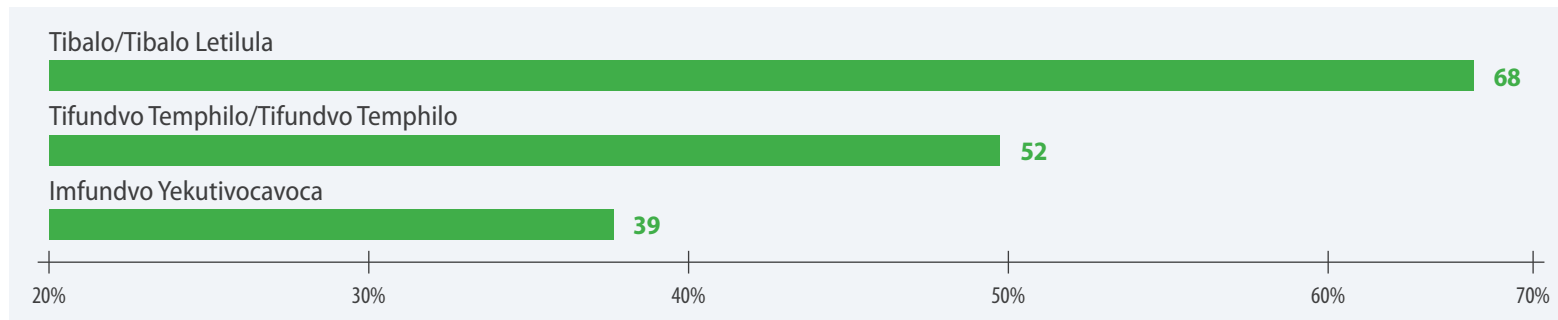


5
**KUBAMBANA
KWAKHO
NEMIBUTO
YAMAHHALA:**
Tindlela
tekusebentisa
tinhlelo tekusebenta
letiku-inthanethi.

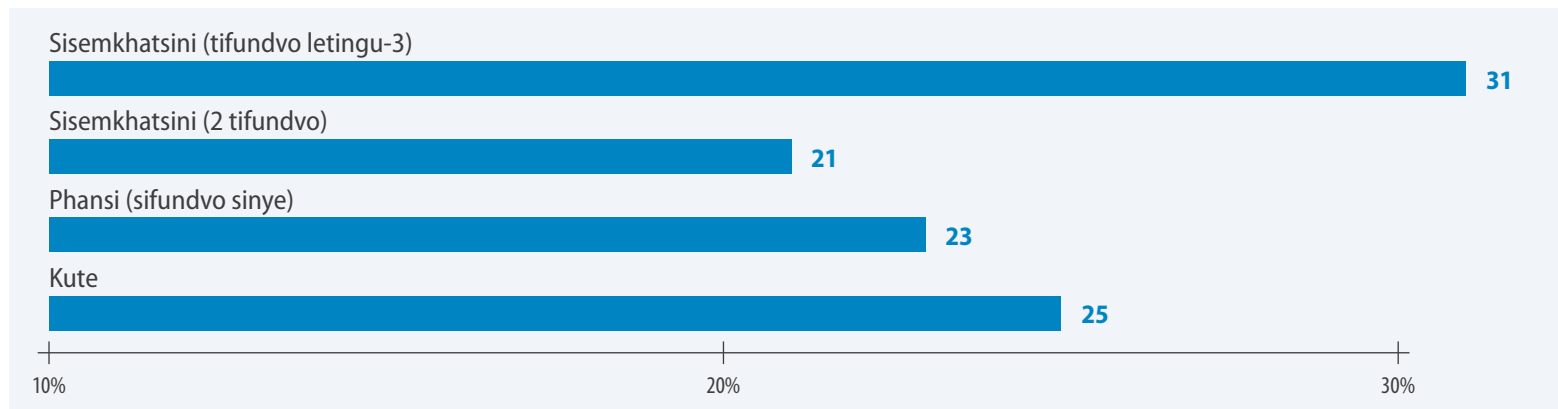
10.1 Kusebentisana kwemfundvo: Lizinga lekutimbandzakanya netifundvo te-STEM esikolweni

Lwati lwesayensi kanye nemibono mayelana nesayensi kuyahambisana. Labaphendvulile be-SAPRS bachaze tifundvo te-STEM labakhetsa kutifundza esikolweni ngemuva kweLibanga 9.

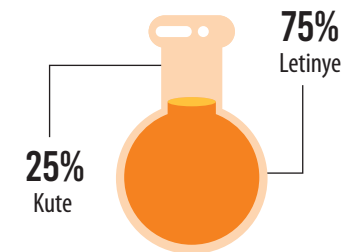
Kuhlanganyela esifundvweni se-STEM ngemuva kweLibanga 9 (%)



Inkomba Yekubandzakanyeka kwe-STEM (%)



Kuchayeka kuletinye tifundvo te-STEM ngemuva kweLibanga 9



Bantfu labatsatfu kulabalishumi

bebaphumelela kakhulu ku-STEM, batsatsa tonkhe tifundvo letintsatfu te-STEM letahlolwa ngemuva kweLibanga 9



Labo labanekuhlanganyela lokusezingeni leliphakeme kwe-STEM:

- bebanemazinga laphakeme ekuphumelela etifundvweni, kanye nekwesekelwa ngemfundvo ekhaya,
- bavela emakhaya laneSimo Setenhlalakahle Netemnotfo (SES) lesiphakeme,
- bantfu labasha, bafundzi, kanye nalabo labafundze,
- futsi bavame kuba bantfu labamhlophe.

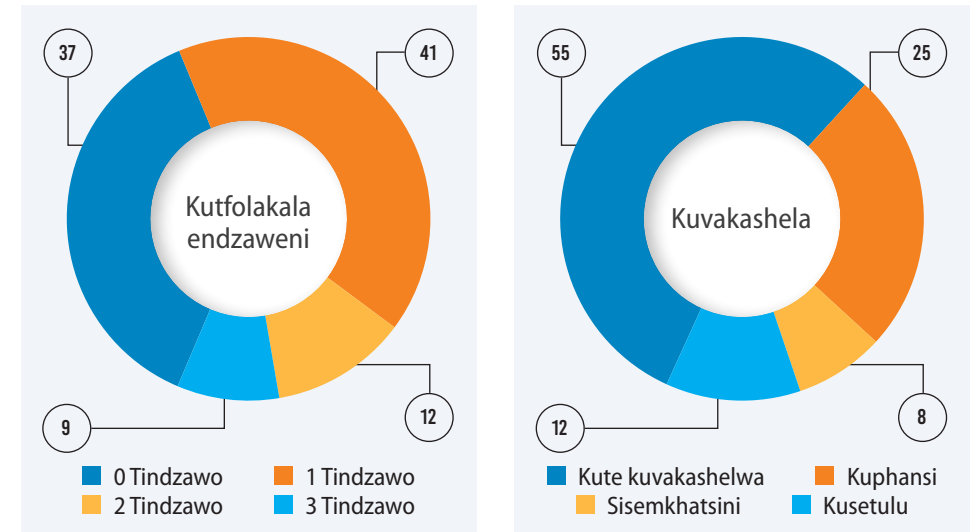
10.2 Kubandzakanyeka lokusekelwe enshisekelweni: Kufinyelela kuletinye tindzawo te-S&T

Impendulo yebahlanganyeli ku-SAPRS iphindze futsi yakhombisa kutsi ngabe kunetindzawo te-S&T letifana nemitapolwati, tikhumbuto noma tikhungo te-S&T letisedvute netindzawo tabo, nekutsi ngabe bebakhona yini kuleto tindzawo. Ngetulu kwesitsatfu semmango (37%) abavunyelwe kuba netinsita te-S&T letifana nemitapolwati, tikhumbuto noma tikhungo te-S&T letisedvute nabo, kantsi cishe 55% abavunyelwe kutsi babe setindzaweni te-S&T noma emicimbini.

Kutfolakala kwaletinye tikhungo te-S&T kanye nekuba khona emicimbini (%)

	Tindzawo te-S&T kanye nemicimbi	Kutfolakala endzaweni	Kuvakashelwe
	Ummango wemtapolwati	55	30
	Imisebenti yesayensi yemmango, njengekuhlanta, kuhamba etindzaweni temvelo	14	18
	Tikhumbuto	12	23
	Titjalo tetihlahla, tindzawo temvelo noma tindzawo tekukhoselisa tilwane tasendle, tilwane	10	26
	Tikhungo Tesayensi Netebucwepheshe noma Ematiko Ekubuyeketa	7	16

Kutfolakala kwaletinye tikhungo te-S&T kanye nekuba khona emicimbini (%)

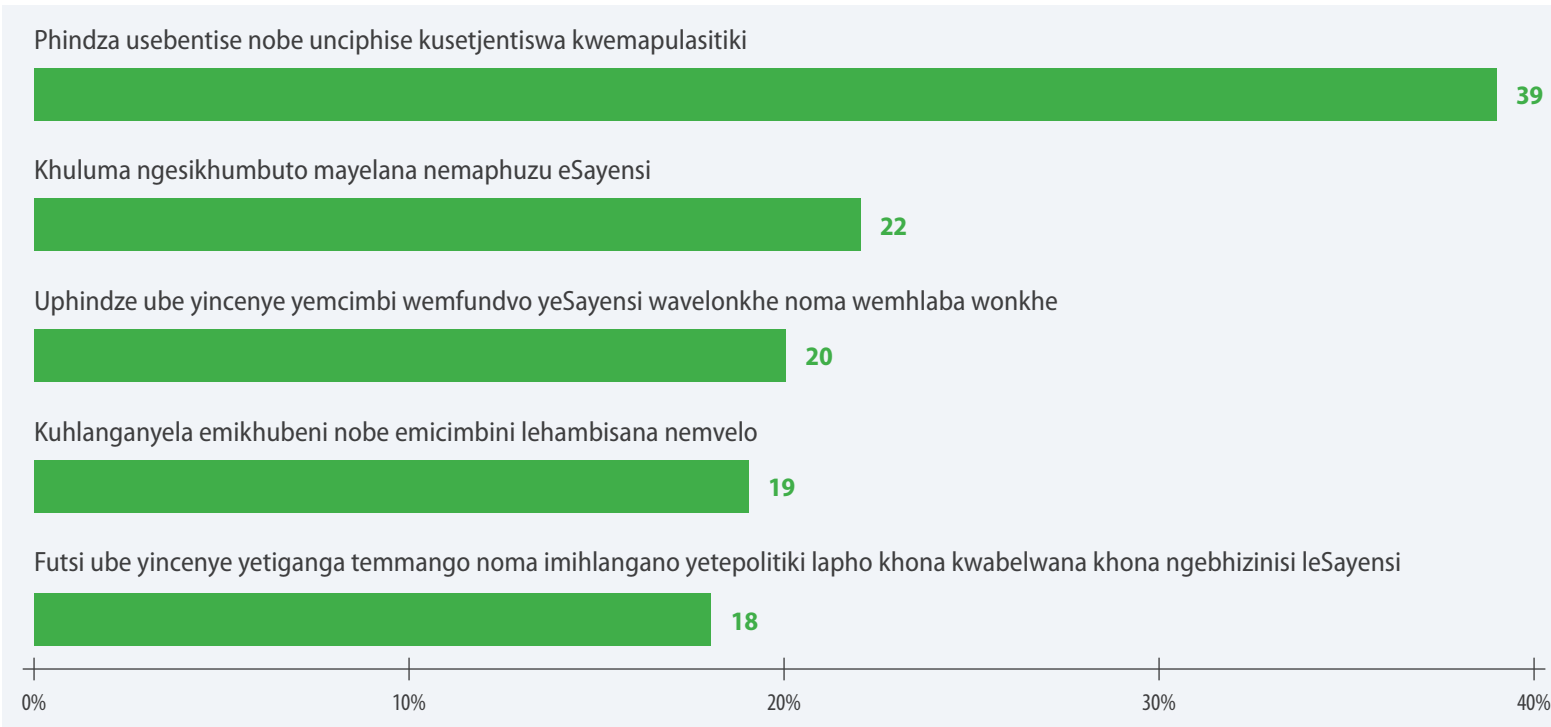


Labo labavakashela imicimbi ye S&T kanye nemisebenti njalo, kanye nalabo labavakashela emasimu, bayatfolakala:

- Labo labafundzile, kusukela kumatekuletjeni kuya embili, kanye nalabo labanekusekelwa ngemfundvo ekhaya,
- Labo labavela emakhaya lahola kakhulu (SES),
- Labo labahlala emadolobheni nasemaphandleni,
- Labo labasebentako, bafundzi, kanye nalabo labafundzako,
- Labo labahlala edvute netitolo te-S&T, kanye nalabo labatfolala lwati lwe-S&T.

10.3 Kungena kwemnotfo emmangweni

Kuphatfwa kwemisebenti yeSayensi emmangweni (% kungahluka)



Ngubani lovame kuhlanganyela emisebenti yeSayensi emmangweni?

- Umphumela wemehluko emkhatsini wetigaba waba nemtselela lomkhulu kakhulu, kusuka ku-8 kuya ku-33.
- Labo labavame kuba nemtselela lomkhulu ekuhlanganyeleni kweSayensi emmangweni ngu:
 - Bantfu labaphumelele etifundvweni tabo, lokufaka ekhatsi tibalo, kanye nalabo labaphumelele emnyakeni wabo wesine wetifundvo kuya etulu,
 - Tisebenti, bafundzi, kanye nebafundzi, kanye
 - Labo labahlala emakhaya nalapho kubhala kukuhle khona.

1 kweliphakade lelisine emalunga aphindze litfupha 7

avele aphawula kutsi imisebenti ye-Science, njengekucubungula umphakatsi kanye nemigubho yemvelo, yayitholakala endzaweni yabo



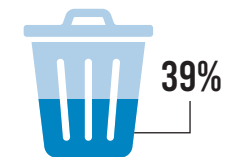
1 kweliphakade lelisine emalunga aphindze litfupha 10

abavama emisebentini ye-Science yekuthuthukisa umphakatsi



UMSEBENTI LOPHUMMELELA KAKHULU

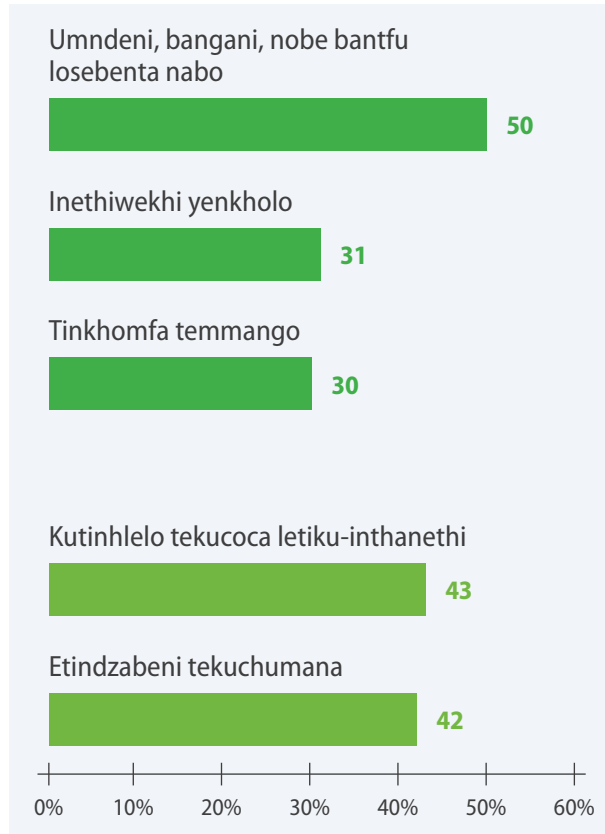
Phindza usebentise imikhicito nobe unciphise kusetjentiswa kwepulasitiki



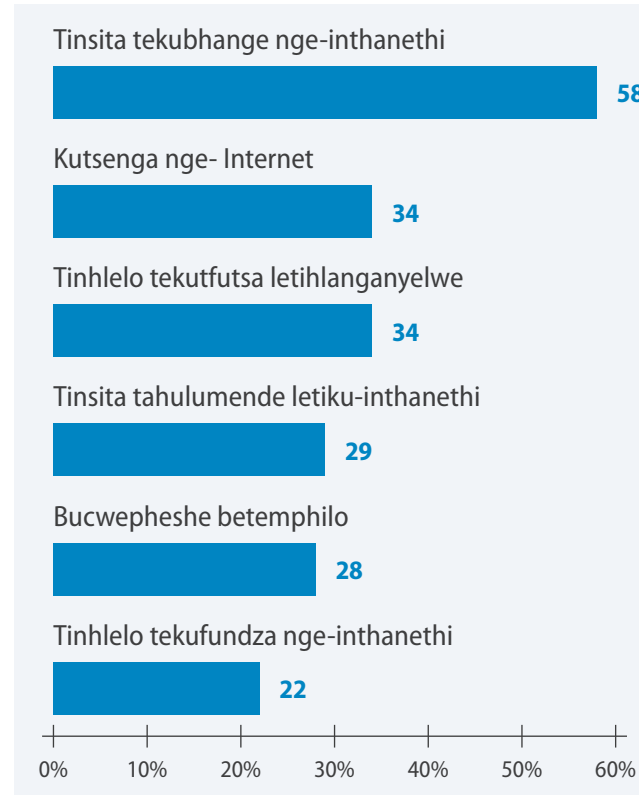
10.4 Kusebentisana ngekwesayensi kanye nekwabelana ngelwati kanye nekusebentisa tinhlelo tekusebenta letiku-inthanethi

Ngetulu kwekutfolo lwati lwetebucwepeshe netesayensi, bantfu bahlanganyela lwati, kanye nekusebentisa tinhlelo tekusebenta letiku-inthanethi. Bekunelizinga leliphansi lekwabelana ngelulwati, kanye nekusetjentiswa kwetinhlelo tekusebenta letiku-inthanethi emkhatsini webantfu. Bantfu babelana ngelulwati lwetebucwepeshe nelwesayensi kakhulu nemndeni, bangani, noma labasebenta nabo emsebentini; futsi sicelo lesisetjentiswa kakhulu ku-inthanethi bekukuphatfwa kwetimali ku-inthanethi.

Kuphatfwa kwelwati: kanjani futsi ngubani (okungenani ngalesinye sikhatsi)



Kusetjentiswa kwetinhlelo tekusebenta letikhetsiwe letiku-inthanethi (% lokungenani ngalesinye sikhatsi)



2 emkhatsini we-10

wemavi apethwe tivakashi letabelana ngeminingwane kanye netisebenti kuhlelo lwe-appli online



- Kwaba nekuhluka lokukhulu emaphuzo enkumbulo, ngeSigaba, ekwabelaneni ngelulwati kusuka ku-18 kuya ku-46, kanye nasekusebentiseni tinhlelo tekusebenta letiku-inthanethi kusuka ku-11 kuya ku-56, kokubili ku-100.
- Labo lababelane ngelulwati lolunyenti futsi bakhombisa kusetjentiswa lokusezingeni leliphakeme kwetimboni tekufaka ticelo letiku-inthanethi bebanematfuba lamakhulu ekutsi:
 - kuba nemfundvo lephakeme kanye nekusekelwa ngemfundvo ekhaya,
 - kuba ne-SES lesetulu,
 - kuba ngulabancane, labasebentako, labafundzako, kanye nebantfwana labaya esikolweni,
 - bahlale etindzaweni tasemadolobheni letisemtsetfweni naletingakahleleki.
- Bantfu labamnyama base-Afrika bebanematfuba lamakhulu ekwabelana ngelulwati, kantsi bantfu baseNdiya/ base-Asia kanye nalabamhlophe bebanematfuba lamakhulu ekubika kusetjentiswa lokusetulu kwaletinye tinhlelo tekusebenta letiku-inthanethi.

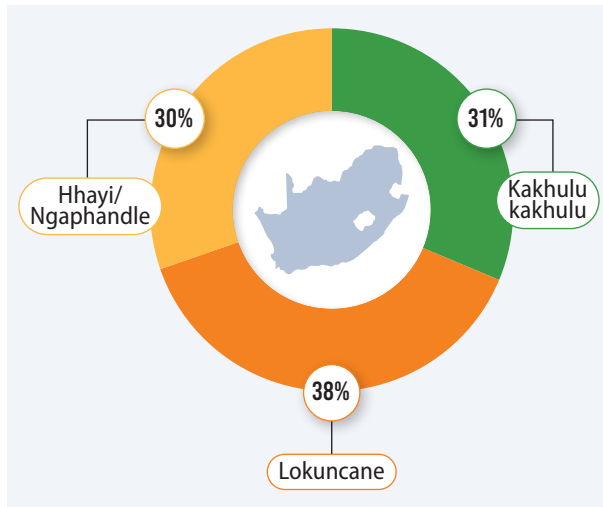
11

Imibono Yekuhlonipha, Litsemba, Netimiso Letiphatselene Neluhlelo Lwemhlaba Wonkhe Lwekusungula Tintfo Letinsha

11.1 Kutigcabha ngeMiphumelelo yaseNingizimu Afrika kutesayensi netebucwepheshe

Ummango lofundzile ngekwesayensi uhlanganiswa tintfo letibalulekile letamukela futsi tisekele i-ajenda yekusungulwa kwetintfo letinsha kulelive. Nanobe bayihlonipha kakhulu imiphumela yeNingizimu Afrika kuSayensi neTheknoloji, labaphendvulile labavela kuyo yonkhe imimango batsi, kuletinye tincenye temhlaba, nakucatsaniswa netifundza letifana neYurophu neNyakatfo Melika, bekubonakala kutsi munye kuphela kulalishumi lovuma kutsi iNingizimu Afrika iyikhokhela phambili.

Lwati Loluphakeme Lwetintfo Letiyinkimbinkimbi Tesayensi Neteucwepheshe eNingizimu Afrika (%)?



Emakhono eNingizimu Afrika e-S&T acatsaniswa njani naleminyane imimango emhlabeni?

iNingizimu Afrika incono kune ...		Intsengo lemukelekako
	Letinye tincenye tase-Afrika	67%
	Yurophu naseNyakatfo Melika	25%
	Tive tase-Asia	18%

- Emaphuzu lasemkhatsini, kuto tonkhe tigaba, ahlala ngaphakatsi kwekuphambuka lokuphansi nalokusemkhatsini lokusemkhatsini wa-24 na-40 wekusebenta kahle kwe-S&T, kanye nasemkhatsini wa-30 na-41 kulabo labakholelwa kutsi imphumelelo ye-S&T yaseNingizimu Afrika beyiphakeme kunaletinye tincenye temhlaba. Loku kusho kutsi bantfu baseNingizimu Afrika bavame kuba nemibono lefanako yekutigcabha ngemphumelelo ye-S&T, noma ngabe bavela etindzaweni letehlukene.
- Labo labakhuluma ngekutigcabha lokukhulu ngemphumelelo ye-S&T bekubantfu labamnyama base-Afrika, labo labanemfundvo lephakeme, labo labafundze kakhulu, kanye nebanfundzi nebanfundzi.
- Labo lebebakholelwa kutsi imiphumela yaseNingizimu Afrika ye-S&T iphakeme kunaleyo yaletinye tive bekubantfu labamnyama base-Afrika, labo labanemfundvo lephansi kanye nekusekelwa lokukhulu kwemfundvo yasekhaya, kanye nalabo labahlala etindzaweni tasemakhaya tasemadolobheni.
- Ngalokwehlukile, labo lebebakholelwa kutsi imiphumela yaseNingizimu Afrika ye-S&T ayikho ngetulu kwaleyo yaletinye tive bebanematfuba lamakhulu ekuba ngemaNdiya/ema-Asia kanye nebantfu labamhlophe, labo labanemfundvo lephakeme, kanye nalabo labahlala emakhaya laphakeme e-SES.

11.2 Setsembiso Sekuceceshwa Kwebantfu Labasha Nge-S&T

Ummango ulinganise kakhulu setsembiso semakhono e-S&T ebantfu labasha. Loku kutfumela umlayeto lomuhle kubantfu labasha mayelana nekubaluleka kanye nekubaluleka kwemakhono e-S&T.

Kufanele kushoswe kubantfwana kutsi bafunde nge-S&T

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I-S&T ilungiselela bantfwana kubhekana nemisebenti emaphusheni emiphakatsini

76

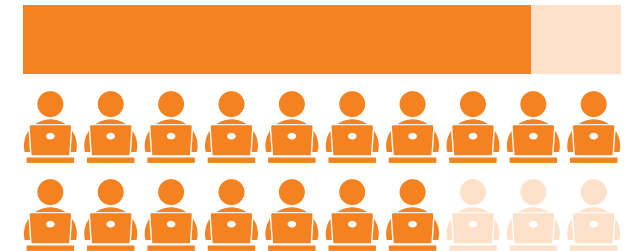


Tinzawo tebantfu labakholelwa kakhulu ephusheni le-S&T emakhono ebantfwana

- Bantfu baseNingizimu Afrika bavame kutsatsa umbono lomuhle ngeliphupho le-S&T emandleni ebantfwana, noma ngabe emakhono abo ahlukahlukene.
- Labo labavumelana kakhulu neliphupho le-S&T bekungu:
 - kanye nemfundvo lengetulu kwesihlahla saphayini,
 - kanye nekusekelwa kwemfundvo lephakeme yasekhaya.

Amakhono e-digital nekokusebenzisa ikhompuyutha ayaphakama kakhulu kubantfwana

85



I-S&T imfundo inika bantfwana imisebenzi eminingi kunezinye izinhlobo zemfundo

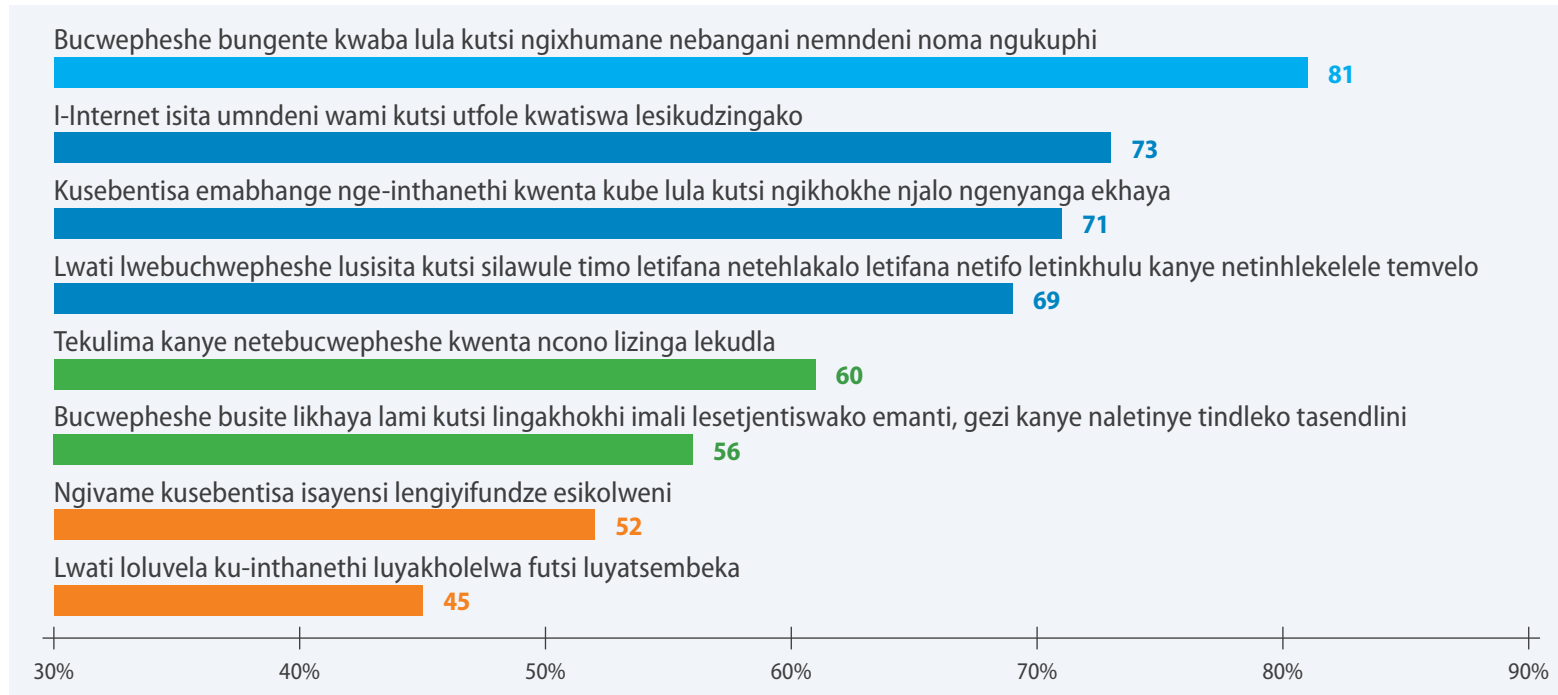
76



11.3 Linani le-S&T ekuphileni kwamalanga onkhe

Sivame kutsatsa intfo njengaleligugu nangabe siyibona ibalulekile ekuphileni kwetfu.

Inani le-S&T ekuphileni kwamalanga onkhe (% sivumelwano)



Bobani labagula kakhulu ku S&T?

- Bantfu labalishumi kulabalishumi balinganise kakhulu i-S&T ngenca yekubaluleka kwekuchumana nemndeni kanye nebangani, kantsi labasihlanu kulabasikhombisa balinganise kakhulu i-S&T ngenca yelwati lwetidzingo tabo tamalanga onkhe kanye netinzuzo tabo.
- Sive lesingaphansi kwehhafu siyavuma kutsi lwati loluvela ku-inthanethi lwetsembekile futsi lunembile.
- Labo labatsandza kakhulu i-S&T:
 - babe nemfundvo lephakeme kunemfundvo yahulumende kanye nekusekelwa kwekufundza ekhaya,
 - bantfwana labancane, bafundzi, kanye nebafundzi,
 - kukhombisa lwati loluphakeme kanye nekuhlonipha i-S&T.

LIZINGA LELIPHAKAMILE LESIVUMELWANO

Inkhululeko yekukhulumisana emkhatsini wemndeni nebangani ngekusebentisa tebuswepheshe

81%



INDLELA YESIVUMELWANO LESENGENSI

Kucinisekisa kanye nekwetsembeka kwelwati lolutfolakala ku-inthanethi

45%



6 kubantfu labadzala labatinkhulungwane

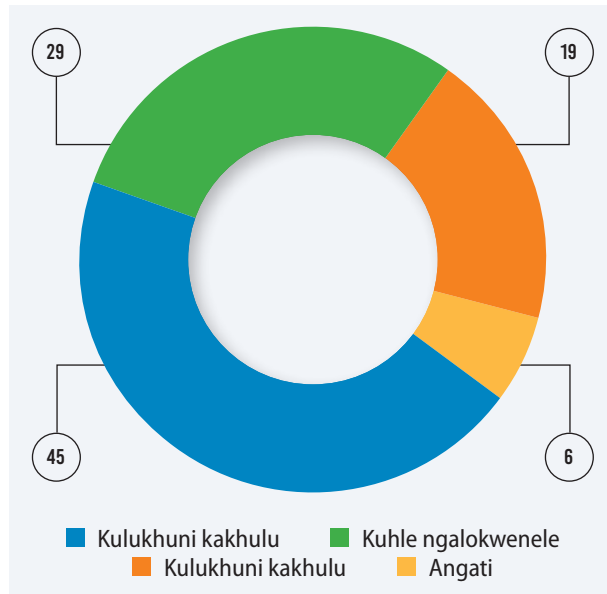
letilishumi batjala imali lebalulekile ku S&T ngenca yekutsi kudla kwentiwe ncono



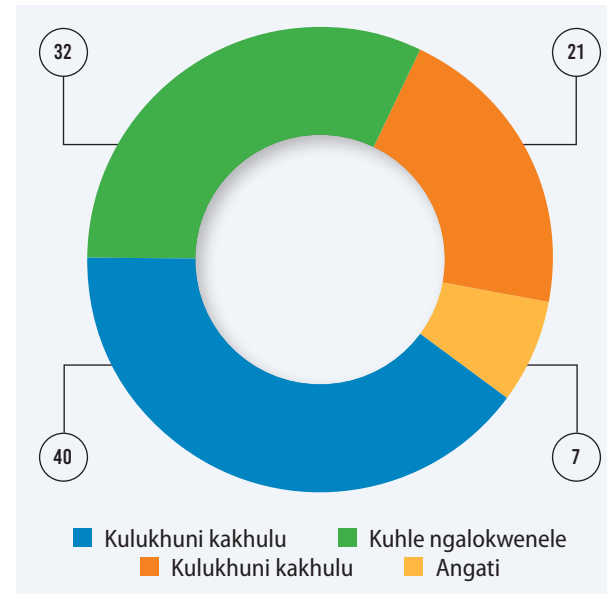
11.4 Kusekelwa ngummango kwekutjala imali kuSayensi neTheknoloji (i-R&D)

Imibono yemango mayelana nekutjala imali elucwaningweni nasekutfutukiseni (i-R&D) ikhombisa hulumende kutsi sabelomali singabekwa njani. Ummango bewunembono wekutsi kusetjentiswa kwemali kwanyalo nguhulumende kanye nemabhizinisi lamakhulu ku-R&D ku-S&T kufanele kutsi kugcinwe noma kukhuliswe.

Lutjalomali lwahulumende ku-R&D (%)



Kusetjentiswa kwemali ye-R&D yemabhizinisi (%)



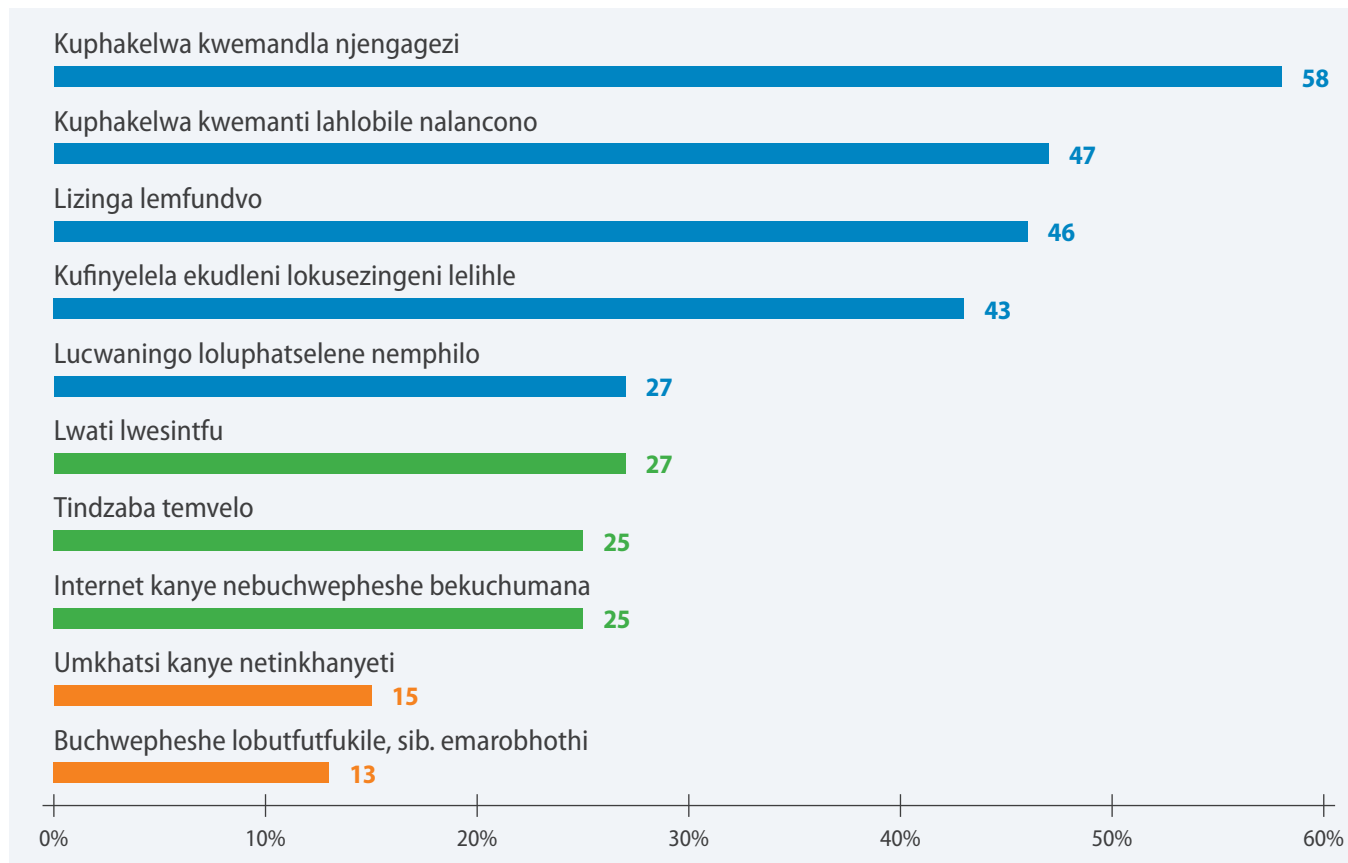
Tindlela taphasi tekukhathazeka kakhulu kutsi imali ye-R&D yanele kakhulu:

- Kuphelele kahle, kutsi kuphumele kahle ekusekeleni imali ye-R&D yeS&T kubekhuluma ngesilinganiso lesiphansi, sivela ku-31 kuya ku-68 ku-100. Lokhu kufanekisa mitselelwane lehlukahlukene kulaba banikati.
- Labo labakhathazeke kakhulu kutsi izinga le-R&D lekufaka imali alanele kakhulu babesuke:
 - Labo banemfundo ephezulu,
 - Labo labavela kumagumbi aphezulu we-SES,
 - Labo abamnyama, abafokoti, neba-Indian/Asian.

11.5 Kuphumelela kwemiphumela yeSikhumbuto se-S&T eNingizimu Afrika

Kusukela eluhlwini lwetihloko letibalulekile te-S&T, ummango wakhetsa etigabeni letine temicimbi yetemfundvo leto letitsatsa njengaletibaluleke kakhulu, kute hulumente achubeke atjale imali kuto. Kuhlobene kakhulu nekuniketwa kwemandla, kuniketwa kwemanti, kanye nekulingana kwemfundvo; ngesikhatsi tihlelo letisezingeni leliphansi tihlale tihlola umkhatsi, tinkhanyeti, kanye nebuchwepheshe lobutfufukile njengemboni.

Tikhono Temphumelela yeSifundvo saseNingizimu Afrika Kutsi Tivikeleke Ekutfufukisweni KweSikhatsi (%)



EMAKHONO LAPHUMMELELAKO EKUPHUMA

Kukhona Emandla

58%



EMAKHONO EMNCWADZO LESIKHATSI

Buchwepheshe lobutfufukile, njengemarobhothi

13%



- Tikwenti letingaphezu kwe-5 tetifiso letingasekeliwe tekucala kwekutfufukiswa (emabhari lamhlophe), letikhethwe ngulabantfu, atfolakala njenge 'kubalulekile kakhulu kanye nekuphuthumako'. Leti tifiso itawufanekisa ematfuba ekuphila kwelule, lapho kubakhona nemiphumela ethinta tinzaba letibonakalako emphakatsini.
- Tinye tifo tisetfu (lamakhanyela aluhlaza) atawufanekisa 'kubalulekile, kodwa akuphuthumeke'.
- Timbalwa takuhlolisiswa letingasekeliwe kulesikhashana "kutfufukiswa kwetimbali" lapho izicelo ezisephakadzelemisha kwazisikhumbuzi singakafinyeleli.

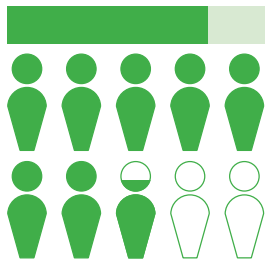
12 Iminwe yebudlelwane beNingizimu Afrika ne-S&T

Kuleyo naleyo mikhakha lengu-27, sihlole (i) kukhumbula lokusemkhatsini (ku-100), kanye (ii) nekugucugucuka kwekukhumbula, sihlola umehluko emkhatsini wekukhumbula lokusetulu nalokuphansi etigabeni letehlukene.

KUKHUMBULA LOKUPHAKAMILE KWAYO KULANDELA:

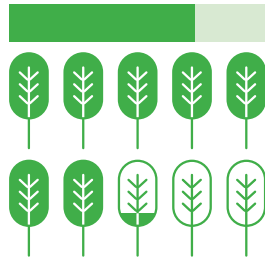
Setsembiso semakhono e-S&T kumalunga elicembu leminyaka

78



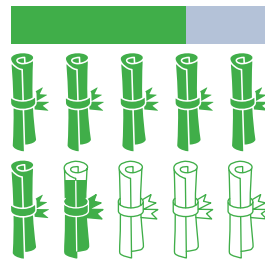
Kukhatsateka ngemvelo

72



Kwetsembela elwatini lwe-S&T loluvela emanyuvesi

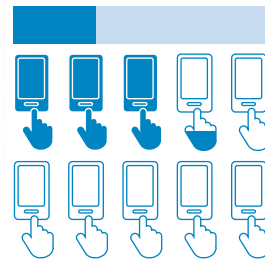
68



TIKHUMBULO LETIPHANSI KANYE TAYO TILANDELA:

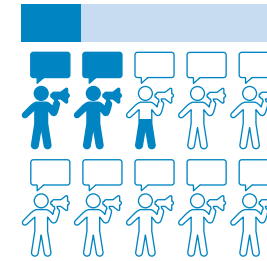
Kusebentisa tihlelo tekusebenta letiku-inthanethi

32



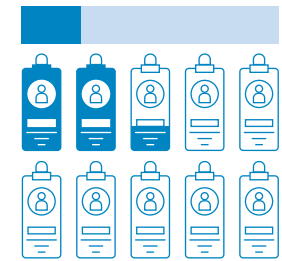
Kukhulumisana nemimango

23



Kuphutsa imicimbi lejabulisako

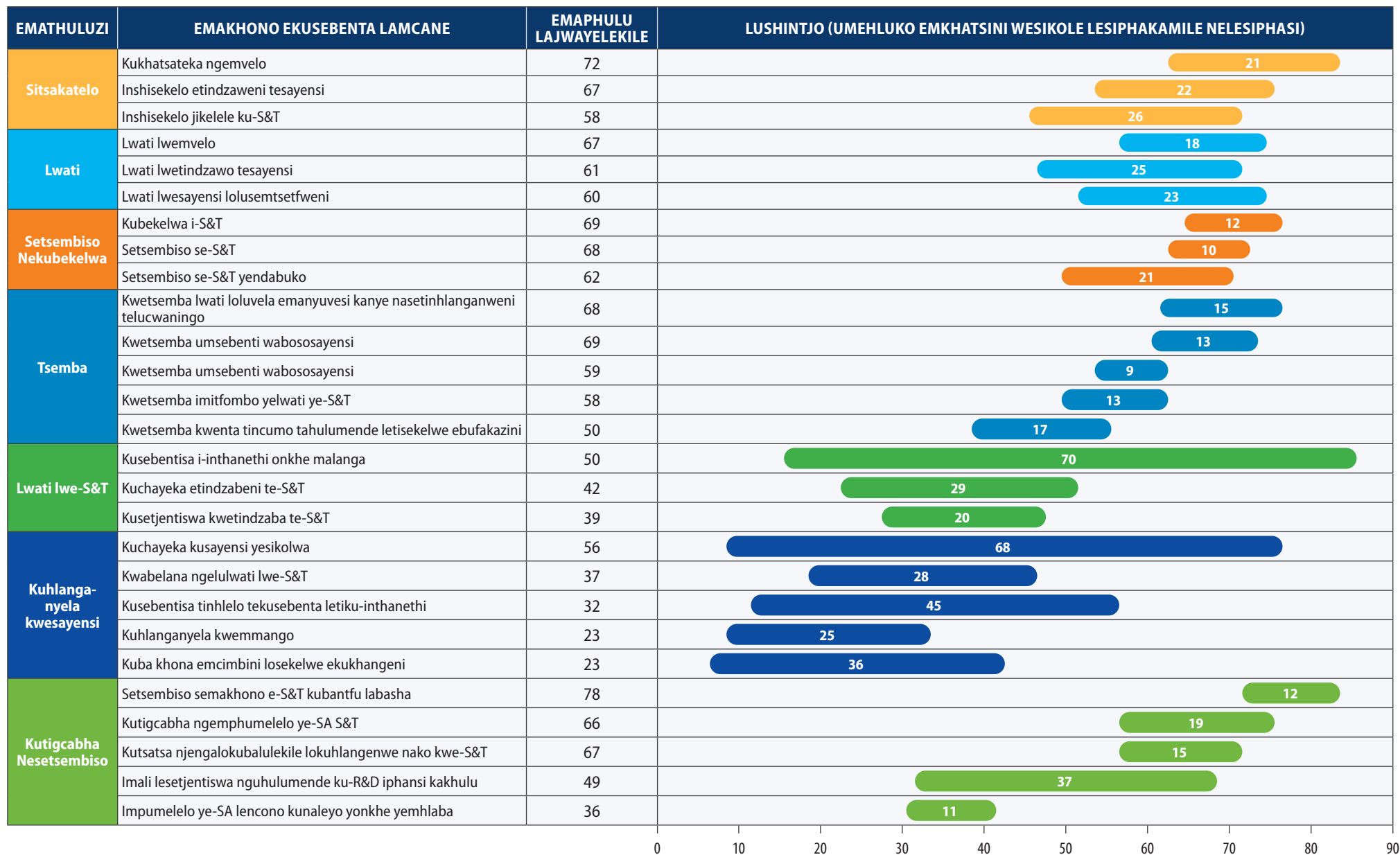
23



Ngetulu kwaloko, kusakateka kwetikali bekuphakeme kakhulu ekusetjentisweni kwe-inthanethi nsuku zonke (70) kanye nekuchayeka etinhlelweni te-STEM tesikolwa (68); futsi bekuphansi kakhulu ngetilinganiso tekwetsemba, litsemba, kanye nemibono yekwemukelwa. Umehluko lomncane wendzawo, lobitwa ngekutsi tindlela tekulingana, kusho kutsi imibono yemimango iyafana, kungakhatsaliseki kutsi kunemehluko etimeni tekuphila tebantfu. Lokuhlukahluka lokukhulu kwendzawo, lokubitwa ngekutsi ngema ratios lehlukile, kukhombisa kungalingani genca yekuhlukahluhana kwetimo tekuphila tebantfu labadzala.

Sibese sakha “umgcini weminwe” lohlukile webudlelwane bemmango waseNingizimu Afrika nesayensi ngekubeka embili sikhala emkhatsini, kanye nekuhlukahluka kwendzawo, kwesilinganiso ngasinye, lesitsatsa ngendlela lelula kwehlukahlukana kwelwati lwesayensi, tindlela tekucabanga, kanye nemazinga ekuhlanganyela.

12.1 Ticondziso Telwati Lwesayensi, Imiva Nekubandzakanyeka, Tilinganiso, Sikhala Lesivamile, Kuhluka Kwesikhala



12.2 Kwehlukana tinhlobo letine tetilinganiso

Kute sivisise kancono umehluko ekuhlanganyeleni kwemango kanye nesayensi, sasebentisa sikhatsi lesisemkhatsini kanye nesilinganiso sekuhluka kwetilinganiso tekuhlola. Sakha tigaba tesilinganiso lesiphakeme nalesiphansi (sisebentisa silinganiso lesisemkhatsini se-50 njengekusika), kanye nemehluko lophakeme (noma lohlukahlukene) nalophansi (noma longagucuki) (sisebentisa umehluko we-20 njengekusika). Sidale tigaba letine.

IMIBONO LEVUMELANAKO NESIKHULU SEKUHLATINGA

- Kutsatsa njengalokubalulekile lokuhlangenwe nako kwe-S&
- Kutigabha ngemphumelelo ye-SA S&T
- Setsembiso semakhono e-S&T kubantfu labasha
- Setsembiso se-S&T
- Kubekelwa i-S&T
- Kwetsemba umsebenti wabososayensi
- Kwetsemba lwati loluvela emanyuvesi kanye nasetinhlanganweni telucwaningo
- Kwetsemba imitfombo yelwati ye-S&T
- Kuguculwa kwemasiko etinhlanganweni tesayensi

IMIBONO LEHLUKILE LENELIPUZU LEKUCUBUZA

- Lwati lwetinzawo tesayensi
- Lwati lwesayensi lolusemtsetfweni
- Kuchayeka kusayensi yesikolwa
- Lwati lwemvelo
- Kukhatsateka ngemvelo
- Inshisekelo jikelele ku-S&T
- Inshisekelo etinzaweni tesayensi
- Setsembiso se-S&T yendabuko

TINYATSO LETIHLUKILE LETINELIPHUZU LEKUCUBUZA

- Kusebentisa i-inthanethi onkhe malanga
- Kusebentisa tinhlelo tekusebenta letiku-inthanethi
- Kuchayeka etindzabeni te-S&T
- Kusetjentiswa kwetinzaba te-S&T
- Kubambana ngesikhatsi sekunikela
- Kwabelana ngelulwati lwe-S&T
- Imali lesetjentiswa nguhulumende ku-R&D iphansi kakhulu

TINYATSELO LETIHAMBANAKO NESIKHULU SEKUHLATINGA

- Impumelelo ye-SA lencono kunaleyo yonkhe yemhlaba
- Kwetsemba kwenta tincumo tahulumende letisekelwe ebufakazini



13 Imiphumela yekwenta ncono budlelwane emkhatsini wem- mango nesayensi eNingizimu Afrika



1

INHLANGANO YESAYENSI IDIZINGA I-PARADIGM YESAYENSI NEMPHAKATSI

Lucwaningo lolukhona, kanye nendlela ye-DSI yekuphatsa isayensi, isekhatsi kwendlela yesayensi-emmaangweni lebona budlelwane lobubuyiselanako nalobuhlangene emkhatsini wesayensi nemmango, kanye nendzima yetikhulu nebantfu.



2

KUFUNeka SHINTJE LULWIMI NGENDLELA LESIBHALA NGAYO NGEKUCHAZA KANJANI UMMANGO WASENINGIZIMU AFRIKA

Imibono yaseNingizimu Afrika iyacabangisisa, iyacabangisisa, ihlakaniphile, futsi ikhombisa kucaphela intfutuko kutesayensi netebucwepheshe (S&T). Ngesilinganiso lesingetulu kwemaphesenti langu-50, sive siveta imibono lefanako kungakhatsaliseki kutsi sivelaphi emmaangweni nasebuhlanga. Kuleminye imizamo, kwavela umehluko ekuphendvuleni kwemmango.



3

AWUSIYO UMNTFWANA EKULUNGISENI LWATI LWESAYENSI

Tinhlelo temfundvo yesayensi kufanele kutsi tizuzwe ngetindlela letehlukahlukene tetindzaba tendzabuko netenhlo, kufaka ekhatsi isayensi lehambisana nemphilo yemuntfu, kute kutsi ifakwe kuto tonkhe tingcoco temmango.

**4****KHULA LUTSANDVO LWE-S&T FUTSI UBUTSELE LISIKO LESAYENSI**

Tinhlelo tekuhlanganyela kusayensi letikhona nyalo kufanele kutsi tandziswe, futsi tinhlelo letinsha letinetingcikitsi letifanele naletitsintsako kufanele kutsi ticaliswe futsi tetfulwe ngetindlela letehlukahlukene. Letinhlelo kufanele tihlose kufaka lisiko lekutinikela kusayensi kanye nekuhlola emmangweni.

**5****LWATI, LUTSANDVO, NESAYENSI KONKE KUYAFANA**

Kunaka tintfo letivusa inshisekelo kungenta kube melula kungenelela. Loku kunemandla ekwakha umjikeleto lohlangene futsi kunemitsela kuleminywe imisho lehlolwe kulolucwaningo, njengelwati nekukhatsateka.

**6****KUBALULEKILE KUBALULEKILE KWEMIHLANGANO YEKUFUNDZA EKHAYA**

Kulolucwaningo, emaphuzu laphakeme bekahlobene nekusekelwa ngemfundvo ekhaya, njengekukhutsata kufundza, kwenta umsebenti wasekhaya, kanye nekucoca tindzaba, kanye nemphumelelo ekutsatseni tifundvo tesayensi esikolweni. Kusekela imfundvo ekhaya kukhombisa kubaluleka kwekufundza kwetitukulwane letihlukene kanye nekwakha lwati.

**7****UMBONO NGEMALI, NEKUTS KUTSEMBA NEKUTSEMBEKA KU S&T KUKHONA NJENGESIKHULU SEKUJABULA**

Kucinisekisa nekwakha kulemibono, kuyadzingeka kutsi kucinisekiswe kudalwa kweluhlelo lwemasiko loluhlonipha, lugubhe, futsi lugcugcutele i-S&T. Kufanele sakhe simo semasiko lesikhombisa tincumo letentiwa ngekusebentisa bufakazi, kucocisana, kugceka, kanye nekuphikisana ngetizatfu.



8

LIVINGA LEWATI LWESAYENSI NEMININGWA, INCAZELO KANYE NEKUDDUDUZA NGELULWIMI LWE-S&T LILAHLAZIWA NJENGEKUKALANGA KWEMEHLUKO.

Tintfo letiyinhloko letichaza lokuhlukahlukana tifaka ekhatsi kufinyelela emfundvweni, simo setimali, kanye nekuba ngumfundzi noma umhlanganyeli emfundvweni. Kukhulumisana ngekwesayensi kanye nekutibandzakanya ngetindlela letehlukahlukene, kusukela ekushicileleni, kuya ekusakateni kuya etindzabeni tekuchumana, kufanele kutsi kuchubeke kukhutsatwe futsi kubekwe umtsetfo.



9

KWANDZISA KUFINYELELA KWELWATI LWE-S&T

Bantfu labanyenti labane-Internet baphindvwe katsatfu ngetulu kwalabane. Bantfu batsebele kulolunye lwati lwe-S&T loluniketwa kumabonakudze nasemsakatweni kepha baphindze futsi batsebele kakhulu etindzabeni te-S&T etindzabeni tekuchumana. Lwati lwe-S&T kufanele lufundziswe ngetindlela letilula kutivisisa, ikakhulukati kumabonakudze nasemsakatweni.



10

KUNEMITSETFO LECINILE ESIMOBENI SEKUKHULUMA NESAYENSI, KODVWA INGATSINTSEKA NGEKUHLE NGEKUKHUTSATSA LWATI KANYE NEKUSEBENTISA SIFISO SESAYENSI KANYE NEKUKHULUMA NGEKUPHELA

Ngalokuvamile, lizinga lelipansi lekuchumana kwesayensi liyabonakala kuto tonkhe tinhlobo tekubambisana. Imikhankhaso yekukhutsata kusetjentiswa kwelwatiso, kulangatelelela lwati, kanye nelwati, lokuhlanganiswe nemitamo yekwandzisa kufinyelela kumasayithi e-S&T kanye nemicimbi, kulindzeleke kutsi kube nemtselela lomuhle ezingeni lekuchumana ngesayensi.



11

FUNDZISA UMNKATI WELIKHAYA NGEMVELA YE-S&T

Kudzinga imizamo lehlekile yekukhulumisana, kwatisa, kufundzisa, kugubha, kanye nekwakha lwati lwalenzawo lecebile ye-S&T emmangweni wonkhe.

Tikhombo

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Kuhunyushwa ngu: Lain Transcriptions (Pty) Ltd

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