

,Q WKH FRQWH[W RI ,QWHULR
GHSDUWPHQWV LQ 7XUNH\ 'HVLJQ
HGXFDFWLRQ

6HUSLO DQDOLLI 6\N 0DNDNO

,úŃN 8QLYHUVLW\)DFXOW\ RI)LQH \$UWV 'HSDUWPHQW RI ,Q
,úŃN 8QLYHUVLW\)DFXOW\ RI \$UFKLWHFWXUH DQG 'HVLJQ 'H
7XUNH\

\$EVWUDFW FRXUVHV RI GHVLJQ VWXGLR DUH WKH PRVW
HGXFDFWLRQ DV DQ HVVHQWLDQ SDUW RI LQWHULRU D
DUHDV ZKHUH WKLQNLQJ DQG GHVLJQ VNLOOV RI WKH
GLIIHUHQW IURP RWKHU FRXUVHV ,QFUHDVHG QXPE
DFDGHPLF PHPEHU LQ WKH SURMHFW FRXUVHV FRQG
V\WHP KDV UHVXOWHG LQ IDLOXUH WR VXVWDLQ SUR
DQG UHGXFHG WKH SURGXFWLYLW\ TXDOLW\ RI HGX
SXUSRVH RI WKLV VWXG\ LV WR DGGUHV WKH HGXF
YDULRXV IRUPV LQ WKH GHVLJQ VWXGLR FRXUVHV
GHSDUWPHQWV LQ 7XUNH\

.H\ZRUG WHULRU DUFKLWHFWXUH LQWHULRU DUFKLW
VWXGLR FRXUVH SODQ

,QWURGXFWRQ

,QWHULRU \$UFKLWHFWXUH LV RQH RI WKH PRGHUQ
ZLWK WKH LPSDFW RI VRFLR FXOWXUDO DQG HFRQRPLF
,QWHULRU \$UFKLWHFWXUH HGXFDFWLRQ LV EHLQJ VKDS
DUFKLWHFWXUH HGXFDFWLRQ LV SDUWLFXODUO\ JXLGHG
GHVLJQ VWXGLR LQ HGXFDFWLRQ LV VXEVWDQWLDQ \$F
DFW LV D FRQFHSW LQYROYLQJ FUHDWLRQ RI D QHZ
EHIRUH > @ 'HVLJQ LV D FUHDWLYH SURFHVV DQG WKH
SURIHVVRQV DQG WKH HGXFDFWLRQ LV WKH GHYHORSP
DQG GLUHFWRQV 7KH SXUSRVH RI SURIHVVRQDO V
\$UFKLWHFWXUH HFW LV WR FRQYH\ WKH PHWKRQ DQG
'HVLJQ HGXFDFWLRQ LV DQ HGXFDFWLRQ PRGHO WKDW Y
VWXGHQW DQG ZKLFK LV UHDOLJHG WKURXJK WKH NQRZ

D &RUUHVSRRQLQJ DXWKRU HOLI VX\XN#LVLNXQ HGX WU

SUREOHPDWLF DQG IRUPDWLRQ RI PHWKRGV WKDW HQD
 > @ 'HVLJQ VWXGLR LQFOXGHV D FRPELQHG XVH RI RV
 SURFHVV WR OHDUQ DQG GHYHORS WKH DFW RI GHVLJQ
 DV SDUW RI GHVLJQ VWXGLR WR EH FRPSOHWHG DW
 \$UFKLWHFWXUH GHSDUWPHQWV LW LV XVXDOO\ SUHV
 UHTXLUHV RQO\ SURMHFW GHOLYHU\ 'HVLJQ VWXGLR
 HYDOXDWLRQ RI WKH SURMHFW E\ GLIIHUHQW DFDGHPL
 RQH WR RQH LQWHUYLHZV UHVLVLRQV DQG FULWLFV EY
 SK\VLFD RXWFRPH WKH DEVWUDFW DFWXDOLW\ RI WK
 7KXV GHVLJQ PDLQO\ IRFXVHV RQ KRZ WR FRQGXFV WH
 UHVXOW > @ ,Q D VHQVH WKH FRXUVHV RI GHVLJQ V
 HGXFDWLRQ DV DQ HVVHQWLDO SDUW RI LQWHULRU DU
 LQ HGXFDWLRQ WKH 'HVLJQ 6WXGLR YDULHV LQ WHUPV
 IRU LQGLYLGXDO ,QWHULRU \$UFKLWHFWXUH GHSDUWPH
 DFDGHPLF PHPEHU LQ WKH SURMHFW FRXUVHV FRQGXFV
 PHQWRU V\ VWHP KDV UHVXOWHG LQ IDLOXUH WR VXV
 UHGXFHG WKH SURGXFWLYLW\ DQG TXDOLW\ RI HGXFD
 ,QWHULRU \$UFKLWHFWXUH GHSDUWPHQWV UHVXOWV LQ
 \$FFRUGLQJO\ WKH VWXG\ DGGUHVHV ,QWHULRU \$UF
 SURFHVV ,QWHULRU \$UFKLWHFWXUH GHSDUWPHQWV L
 PHWKRGV RI GHVLJQ VWXGLR 7R WKLV DLP WKH SXUS
 PHWKRGV DSSOLHG LQ YDULRXV IRUPV LQ WKH GHVLJQ
 LQ 7XUNH\

'HVLJQ 6WXGLR (GXFDWLRQ DQG PHWKRGV DV
 'HSDUWPHQWV

,QWHULRU \$UFKLWHFWXUH LV D ILHOG RI RFFXSDW
 VFLHQWLIF WHFKQLFDO GDWD WR EH UHIOHFWHG LQ
 WHFKQLFDO DHVWKHWLF VROXWLRQV WR HQVXUH XVHU
 VW\OH DQG LGHQWLW\ IRU WKH VSDFH > @ (PHUJLQJ
 LQWHULRU DUFKLWHFWXUH > @ HQWHUHG WKH SURFHVV
 D SURIHVVLRQ QRW ORQJ DIWHU ZKHQ D KLJKHU HGXFD
 IRU WKH ILUVW WLP E\ 3DUVRQ V 6FKRRO RI 'HVLJQ W
 HGXFDWLRQDO PHWKRGV YDU\ IRU ,QWHULRU \$UFKLWH
 LQFUHDVHV UDSLGO\ WRGD\ 3UHVHQFH RI PDQ\ GHSDU
 GLIIHUHQW DVSHFWV LQFOXGLQJ WKHRU\ DUW WHFKQ
 WDNLQJ LQR FRQVLGHUDWLRQ WKH SURJUDP PHDVXUH
 HGXFDWLRQ 1HYHUWKHOHVV VLQFH GHSDUWPHQWV VH
 VDPH EXW WKH\ DUH VKDSHG WKURXJK GLIIHUHQW PH
 \$UFKLWHFWXUH GHSDUWPHQWV FRQVLGHU &,'\$ FULWH
 VWUXFWXUH > @ &,'\$ LV DQ LQWHUQDWLRQDO 1*2
 \$UFKLWHFWXUH HGXFDWLRQ SURJUDPV LQ WKH 86 DQG
 RI ,QWHULRU \$UFKLWHFWXUH HGXFDWLRQ \$FFRUGLQJ
 LPSURYH WKH TXDOLW\ RI LQWHULRU VSDFHV ZLWK W
 HIILFLHQF\ DQG HQVXUH VHFUXLW\ RI SHRSOH RQ D SUR
 H[SHULHQFHV 7KH GLIIHUHQFHV DPRQJ FXUULFXOD RI
 7XUNH\ DUH PDLQO\ UHIOHFWHG RQ FRXUVH FRQWHQW
 FXUULFXOX LV WR WDUJHW WKH SURMHFW DQG DGDSW
 LQ GHVLJQ DQG IRU VWXGHQWV ZLWK FRPELQHG XVH P
 DGRSW D YHUEDO ODQJXDJH EHIRUH DWWHQGLQJ GHVL

ODQJXDJH ,Q RWKHU ZRUGV WKH\ DUH IDFHG ZLWK WK
WKLQNLQJ DQG SUHVHQWDWLRQ > @ %DVHG RQ VXFK L
H[HFXWRU PXVW FRPSOHPHQW RQH DQRWKHU)RU -X
DGGUHVVLQJ WKH UHODWLRQV DPRQJ H[HFXWRU VWXG
EHWZHHQ WKH VWXGHQW DQG NQRZOHGJH VWXGHQW P
WKH\ DOVR GHSHQG RQ WKH H[HFXWRU ([HFXWRU LQV
H[HFXWRU %HLDUW EHOLHYHV LQ WKH ILUVW SODFH I
GHIHQGV WKH YDOLGLW\ RI RWKHU PHWKRGV LQ WKH IR
VRFLDO HQYLURQPHQWV GULYLQJ FUHDWLYLW\ EH\RQG
GHVLJQ VWXGLR HQYLURQPHQW IDFLOLWDWHV JHQHUDV
WKDQ DFWLQJ DV D SK\VLFDQ VSDFH ZKHUH WKH GHVLJ
> @ 'HVLJQ VWXGLR LV D FUHDWLYH SURFHVV LQYRO
H[HFXWRU ,W IHDWXUHV FRRSHUDWLYH ZRUN IURP WKH
DQG g]NHU > @ OLVWV WKH JHQHUDO WHDFKLQJ PHWK
IROORZV

- ‡ 3UREOHP VROYLQJ PHWKRG 'LVFXVVLRQ OHWKRG
- ‡ ,QGLYLGXDO :RUNLQJ OHWKRG ,QGLYLGXDO :RUNLQJ
- ‡ OHWKRGV RI ([SUHVVLRQ 6HPLQDU (QYLURQPHQW
- ‡ &DVH 6WXG\ OHWKRG /LEUDU\ (QYLURQPHQW
- ‡ ([HFXWLRQ ([SHULHQFH OHWKRG ORGHO %XLOGLQJ
- ‡ &RPSXWHU 8VDJH (QYLURQPHQW

([HFXWRU LQ WRGD\ V GHVLJQ VWXGLRV EHQHILW IU
PHWKRGV LQVWHDG RI D VLQJOH HGXFDWLRQDO PHWK
ZRUNVKRS SOD\ V D NH\ UROH LQ HIIHFWLYH LPSOHPH
PHWKRGV RI GHVLJQ VWXGLRV ZKLFK YDU\ IRU LQGLYL
XVXDOO\ DV IROORZV %HVLGHV GHVLJQ VWXGLHV FRQ
GHVLJQHU WDONV GHVLJQ GHVLJQHU ZRUNVKRSV H[F
VHPLQDU GD\ V IRU H[SHUWV RU FRPSDQ\ RZQHUV HWF
DGGWLWRQ SURMHFWV SUHSDUHG GXULQJ WKH WHUP P
WKH FULWLFV 2QH WR RQH GLVFXVVLRQ JURXS FULWL
NH\ UROH LQ WKH GHVLJQ VWXGLR FRXUVH 7KH\ PXVW
VWXG\ DQG KHOS WKHP WR LPSURYH WKHLU VNLOOV LQ
6WXGHQWV PXVW FRQVLGHU WKH GHVLJQ VWXGLR VSD
PDQQHU ZKLOH WKH SURMHFW H[HFXWRU HQFRXUDJH
HQYLURQPHQW

'HVLJQ 6WXGLR (GXFDFWLRQ DW ,QWHULRU \$U

7KHUH DUH VXEVDQWLDO GLIIHUHQFHV DPRQJ ,QV
7XUNH\ %H\RQG WKDW WKH PDLQ SUREOHP RI RXU H
LQFUHDVH LQ WKH QXPEHU RI GHSDUWPHQWV ZKLFK D
QXPEHU RI WUDLQHG DFDGHPLFLDQV LV ORZ ,Q 7XU
\$UFKLWHFWXUH GHSDUWPHQWV DQG D QHZ RQH MRLQV
LQ QXPEHU :KLOH WKH FRXUVHV DW GHSDUWPHQWV ZL
WKH QXPEHU RI DFDGHPLF PHPEHUV IDOOV VKRUW RI I
FRXUVHV OD[LXP QXPEHU RI SURMHFW VWXGHQWV IRU
SURGXFWLYH HGXFDWLRQ E\ WKH HQG RI WKH WHUP :K
WZHOYH LW ZLOO QRW EH SRVVLEOH WR VSHDN RI TXI

FRXUVH KRXUV 7KH WLPH RI SURMHFW FRXUVHV PXVW
VWXGHQW IDFLOLWDWLQJ VXIILFLHQW WLPH DQG VS
\$UFKLWHFWXUH GHSDUWPHQWV LV IRXU \HDUV HLJKW
GHOLYHU ILYH WHUP SURMHFWV DQG RQH JUDGXDWLR
GHSDUWPHQWV SULRULWL]H WKH FRQFHSW RI GHVLJQ
SUHFHGHQFH WR DSSOLHG WUDLQLQJ 7KHUHIRUH WKH
WKH DJUHHG FXUULFXOD \$QG WKLV LV UHIOHFWHG R
H[DPSON DQ ,QWHULRU \$UFKLWHFWXUH GHSDUWPHQW
VWXGLR FRXUVHV ZKLOH DQRWKHU GHSDUWPHQW RI
WUDQVIHUULQJ FRXUVHV IURP GHSDUWPHQWV ZLWK H[
DQG KRXU RI RWKHU FRXUVHV DUH UHGXFHG 2Q WKH R
OHVV KRXUV RI GHVLJQ VWXGLR FRXUVHV WKH KRXUV D
QRW SRVVLEOH WR FUHDWH D SURGXFWLYH SURMHFW
GHVLJQ VWXGLR &XUULFXOD VHUYH DV WKH PLUURU R
ZLWK WKH SXUSRVHV RI HGXFDWLRQ ,QWHULRU \$UFKL
HOHPHQWV ZLWKLQ IDFXOWLHV RI DUFKLWHFWXUH ZKL
)RU H[DPSON WKH FRXUVH FRQWHQWV RI D GHSDUWP
FRXUVHV OLNH YROXPH GHVLJQ IXUQLWXUH GHVLJQ ZK
RQ PDLQO\ VWUXFWXUH FRXUVHV OLNH NQRZOHGJH RI
KRZ FRXUVHV RI GLIIHUHQW TXDOLWLHV LQ WKH FXUU
GLYHUW IURP RQH DQRWKHU > @ (VSHFLDOO\ WKH GHV
GHVLJQ VWXGLR GLIIHU JUHDWO\ IRUP GHSDUWPHQW V
GHWDLO RULHQWHG VROXWLRQV ZKLOH RWKHUV DFW
LPSRUWDQW VWDJH RI GHVLJQ FRXUVHV LV GUDZLQJ V
LQWHULRU DUFKLWHFWXUH DQG RWKHU YLVXDO DUWV L
RI GHVLJQ HQVXUHV LQWHJUDWLRQ RI VWXGHQW V LP
FRQLQXHV IURP WKH VWDUW WR WKH ODVW SKDVH RI
DSSOLHG LQ WKH GHVLJQ VWXGLR LV SDUWLFXODUO\ UH
7KH PRUH VXIILFLHQW LV WKH WLPH VSDUHG IRU SURM
IRFXV RQ WKHLU SURMHFW 7KH GHVLJQ HGXFDWLRQ SU
OLPLWHG H[SUHVVLRQ WHFKQLTXHV WKH HGXFDWLRQ
ZLWK YDULRXV WKHRULHV DQG PHWKRGV LQFOXGHG LQ
PRVW FRPPRQ WHFKQLTXHV LQ GHVLJQ VWXGLR HGXFD
PHWDSKRU HYROXWLRQDU\ GHVLJQ VTXDUH * PHWKR
SUDFWLFHV > @ 6XFK YDULRXV VWXGLR SUDFWLFHV D
GLVFXVV GHVLJQ DQG WR LPSURYH GHVLJQ H[SHULHQFH
FRQVXLQJ FRXUVH LQ WKHLU HGXFDWLRQ DW WKH VFK
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GHVLJQ VWXGLR FRXUVH PXVW EH XVHG RQO\ IRU WKH S
EH DEOH WR ZRUN FRPIRUWDEO\ LQVLGH DQG RXWVLGH
PRVW LPSRUWDQW DVSHFW RI GHVLJQ VWXGLRV PDNLQ
UHIOHFW D GLIIHUHQW OLIHVW\OH > @ ,Q WKLV VHQV
WDNHQ LQWR FRQVLGHUDWLRQ WR GHVLJQ VSDFHV D
RSSRUWXQLW\ IRU SHUVRQDO H[SHULHQFH IURP WKH
ZKHUH LQGLYLGXDOV FDQ EH IUHH LQ WKHLU FRQFHSW
DQG VSDFH PXVW EH GHILQHG WR HVWDEOLVK ZRUNLQJ

7DEO HQWHULRU DUFKLWHFWXUH GHSDUWPHQWV QXPEHU RI V

,QWHULRU DUFKLWHFWXUH GHSDUWPHQWV SODFHF		3RI	4XRWD	/DQJXDJH	&RXUVH	+R
8QLYHUVLW\	)DFXOW\	'HSDUWPHQW	7\SH			
\$NGHQLJ	8QLYHUVLW\	)DFXOW\	QWHULRU \$U	7XUNLVK	'HVLJQ	6WXGLR
\$QDGROX	8QLYHUVLW\	)DFXOW\	(QYLURQPHQWDO	7XUNLVK	QWI	SUFKLWHFWXUH 3URMHFW
%DKoF	)DFXOW\	RI \$UF	,QWHULRU \$U	(QJOLVK	QWI	SUFKLWHFWXUH 'HVLJQ
8QLYHUVLW\	'HVLJQ		(QYLURQPHQWDO	7XUNLVK	QWI	SUFKLWHFWXUH 3URMHFW
dXNXI	)DFXOW\	RI)LQH	,QWHULRU \$U	0)	QWHULRU	UNLVK
8QLYHUVLW\	'HVLJQ		(QYLURQPHQWDO	7XUNLVK	QWI	SUFKLWHFWXUH 3URMHFW
)DWLK	)DFXOW\	RI (QJLQH	HHULO DQG	0)	QWHULRU	UNLVK
0HKPHW	8QLYHUVLW\	)DFXOW\	,QWHULRU \$U		SUFKLWHFWXUH	'HVLJQ
8QLYHUVLW\	'HVLJQ		(QYLURQPHQWDO	7XUNLVK	'HVLJQ	6WXGLR
*HGLN	8QLYHUVLW\)DFXOW\	,QWHULRU \$U	7XUNLVK	'HVLJQ	6WXGLR
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*HGLJ	8QLYHUVLW\)DFXOW\	,QWHULRU \$U	7XUNLVK	QWI	SUFKLWHFWXUH 3URMHFW
	'HVLJQ		(QYLURQPHQWDO	7XUNLVK	QWI	SUFKLWHFWXUH 3URMHFW
+DFH\)DFXOW\	RI)LQH	,QWHULRU \$U	7XUNLVK	QWI	SUFKLWHFWXUH 3URMHFW
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+DVDQ	.D)DFXOW\	,QWHULRU \$U	7XUNLVK	QWI	SUFKLWHFWXUH 3URMHFW
8QLYHUVLW\	'HVLJQ		(QYLURQPHQWDO	7XUNLVK	QWI	SUFKLWHFWXUH 3URMHFW
,uõN	8QLYHUVLW\	)DFXOW\	,QWHULRU \$U	0)	SUFKLWHFWXUH	6WXGLR
	'HVLJQ		(QYLURQPHQWDO	7XUNLVK	QWI	SUFKLWHFWXUH 3URMHFW
øKVDQ	'R	)DFXOW\	,QWHULRU \$U	(QJOLVK	QWHULF	6WXGLR
%LONHQW	8QLYHUVLW\	)DFXOW\	,QWHULRU \$U	7XUNLVK	&RXOG	QRW DFFHVV
øVWDQI	)DFXOW\	RI (Q	,QWHULRU	0)		
8QLYHUVLW\	'HVLJQ		(QYLURQPHQWDO	7XUNLVK	QWI	SUFKLWHFWXUH
øVWDQEXO	%D	)DFXOW\	,QWHULRU	(QJOLVK	SUFKLWHFWXUH	RUNVKRS
8QLYHUVLW\	'HVLJQ		(QYLURQPHQWDO		SUFKLW	
					'HVLJQ	
øVWDQEXO)DFXOW\	RI (QJLQH	HHULO DQG	(QJOLVK	QWHULRU	SUFKLWHFWXUH DQG
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8QLYHUVLW\	'HVLJQ		(QYLURQPHQWDO		'HVLJQ	
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					SUFKLWHFWXUH	3URMHFW
øVWDQE)DFXOW\	RI (Q	,QWHULRU \$U	7XUNLVK	QWI	SUFKLWHFWXUH 6WXGLR
8QLYHUVLW\	'HVLJQ		(QYLURQPHQWDO	7XUNLVK	QWI	SUFKLWHFWXUH 6WXGLR
øJP	(FRQ)DFXOW\	,QWHULRU \$U	(QJOLVK	'HVLJQ	6WXGLR
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.DGLU)DFXOW\	RI \$UW	DQG	7XUNLVK	QWI	SUFKLWHFWXUH 6WXGLR
8QLYHUVLW\	'HVLJQ		(QYLURQPHQWDO		QWHULRU	
.DUDE	)DFXOW\	RI \$UW	DQG	7XUNLVK	QWHULRU	SUFKLWHFWXUH 3URMHFW
7HFKQLFDO	)DFXOW\	RI \$UW	DQG	7XUNLVK	QWHULRU	SUFKLWHFWXUH 3URMHFW
8QLYHUVLW\	'HVLJQ		(QYLURQPHQWDO		QWHULRU	
.RFDHOL	8QLYHUVLW\	)DFXOW\	,QWHULRU	7XUNLVK	QWHULRU	SUFKLWHFWXUH 3URMHFW
	'HVLJQ		(QYLURQPHQWDO		QWHULRU	
.72	.DUI	)DFXOW\	,QWHULRU \$U	7XUNLVK	QWI	SUFKLWHFWXUH 3URMHFW
8QLYHUVLW\	'HVLJQ		(QYLURQPHQWDO	7XUNLVK	QWI	SUFKLWHFWXUH 3URMHFW
6HOoXN	8QLYHUVLW\	)DFXOW\	,QWHULRU \$U	7XUNLVK	QWHULRU	SUFKLWHFWXUH 3URMHFW
	'HVLJQ		(QYLURQPHQWDO		SUFKLWHFWXUH	3URMHFW
6HOoXN	8QLYHUVLW\	)DFXOW\	,QWHULRU \$U	7XUNLVK	QWHULRU	SUFKLWHFWXUH 3URMHFW
	'HVLJQ		(QYLURQPHQWDO		SUFKLWHFWXUH	3URMHFW
			øNLQFL g÷UHWLP			
72% 8QL	)DFXOW\	RI)LQH	,QWHULRU \$U	7XUNLVK	QWHULRU	SUFKLWHFWXUH 3URMHFW
RI (FRQRPLF	DQG	)DFXOW\	,QWHULRU \$U	7XUNLVK	QWHULRU	SUFKLWHFWXUH 3URMHFW
7HFKQRORJ\	DQG	)DFXOW\	,QWHULRU \$U	7XUNLVK	QWHULRU	SUFKLWHFWXUH 3URMHFW
			(QYLURQPHQWDO		QWHULRU	
<DúDU	8QLYHUVLW\	)DFXOW\	,QWHULRU \$U	(QJOLVK	QWHULRU	SUFKLWHFWXUH 6WXGLR
	'HVLJQ		(QYLURQPHQWDO		SUFKLWHFWXUH	6WXGLR

7DEOH FR QWLHQXLFU DUFKLWHFWXUH GHSDUWPHQW QXPEH
 LQ 7XUNH\

,QWHULRU DUFKLWHFWXUH GHSDUWPHQW DGPLW\							
8QLYHUVLW\	)DFXOW\	'HSDUWPHQW	3RL 7\SH	4XRWD	/DQJXDJH	&RXUVH	+RX
\$W00OP 8Q	)DFXOW\ RI)LQH \$UWV	,QWHULRU DUFKLWHFWXUH	DQG (QYLURQP	6SHI	SELOLW\	7XUNLVK	,QGRRU 'HVLJQ
\$YUDV\ D 8Q	)DFXOW\ RI (QJLQH \$UWV	,QWHULRU DUFKLWHFWXUH	DQG (QYLURQP	6SHI	SELOLW\	7XUI	,QWHULRU SUFKLWHFWXUH 3URMHFW
%DúNHQW 8Q	)DFXOW\ RI)LQH \$UWV	,QWHULRU DUFKLWHFWXUH	DQG (QYLURQP	6SHI	SELOLW\	7XUI	'HVLJQ 6WXGLR
%H\NHQW 8Q	)DFXOW\ RI (QJLQH \$UWV	,QWHULRU DUFKLWHFWXUH	DQG (QYLURQP	6SHI	SELOLW\	7XUI	'HVLJQ 6WXGLR
&DQLN	)DFXOW\ RI \$U	,QWHULRU		6SHI	SELOLW\	7XUI	3URMHFW
8QLYHUVLW\	(QJLQH HULQJ	,QWHULRU		6SHI	SELOLW\	7XUI	'HVLJQ 6WXGLR
dDQN	)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	'HVLJQ 6WXGLR
8QLYHUVLW\	)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	3URMHFW
'R=xú 8QLYHUVLW\	)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	3URMHFW
+DOLo 8QLYHUVLW\	)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	3URMHFW
,úON 8QLYHUVLW\	)DFXOW\ RI)LQH \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	3URMHFW
oVWDQE	)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	,QWI
8QLYHUVLW\	'HVLJQ	,QWHULRU		6SHI	SELOLW\	7XUI	SUFKLWHFWXUH 'HVLJQ
oVWDQEXO	'HVLJQ	,QWHULRU		6SHI	SELOLW\	7XUI	3URMHFW
8QLYHUVLW\	)DFXOW\ RI)LQH \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	,QWHULRU
oVWDQEXO	'HVLJQ	,QWHULRU		6SHI	SELOLW\	7XUI	SUFKLWHFWXUH 3URMHFW
8QLYHUVLW\	)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	,QWHULRU
oJPLU 8QLYHUVLW\	)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	SUFKLWHFWXUH
0DOWHSH 8QLYHUVLW\	)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	'HVLJQ 6WXGLR
0DOWHSH 8QLYHUVLW\	)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	(QJOLVK 'HVLJQ 6WXGLR
0DUP	)DFXOW\ RI)LQH \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	,QWI
8QLYHUVLW\	)DFXOW\ RI)LQH \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	SUFKLWHFWXUH 'HVLJQ
0LPDU	)DFXOW\ RI)LQH \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	,QWHULRU
8QLYHUVLW\	)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	SUFKLWHFWXUH 3URMHFW
\$UWV							
1LúD	)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	'HVLJQ 6WXGLR
8QLYHUVLW\	)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	,QWI
2NDQ 8QLYHUVLW\	)DFXOW\ RI)LQH \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	SUFKLWHFWXUH DQG (QYLURQP HQWDO 'HVLJQ
7RURV 8QLYHUVLW\)DFXOW\ RI)LQH \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	'HVLJQ 6WXGLR B
<HGL)DFXOW\ RI)LQH \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	3URMH
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(DVV)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	SUFKLWHFWXUH 'HVLJQ
0HGLWHUUD)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	,QWI
8QLYHUVLW\	.NWF	,QWHULRU		6SHI	SELOLW\	7XUI	SUFKLWHFWXUH
(DVV)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	:RUNVKRS
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8QLYHUVLW\	.NWF	,QWHULRU		6SHI	SELOLW\	7XUI	6WXGLR
*LUQH \$P)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	,QWHULRU 'HVLJQ
8QLYHUVLW\	)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	6WXGLR
7XUNLVK 5HSXEOLF	)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	,QWHULRU 'HVLJQ
2I 1RUWKHUQ)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	6WXGLR
&\SUXV)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	,QWHULRU 'HVLJQ
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8QLYHUVLW\)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	,QWHULRU 'HVLJQ
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5HSXEOLF 2I	(QJLQH HULQJ	,QWHULRU		6SHI	SELOLW\	7XUI	,QWHULRU 'HVLJQ
1RUWKHUQ &\SUXV)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	,QWHULRU 'HVLJQ
&\S	)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	,QWHULRU 'HVLJQ
,QWHUQDWLRQ	)DFXOW\ RI)LQH \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	,QWHULRU
8QLYHUVLW\)DFXOW\ RI)LQH \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	SUFKLWHFWXUH 3URMHFW
1HDU)DFXOW\ RI \$UWV	,QWHULRU		6SHI	SELOLW\	7XUI	,QWI
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6RXUFH 26<0	'HF						

&RQFOXVLRQ

\$V RQH RI WRGD\ V SRSXODU SURIHVVLRQV ,QWHU
GHSUWPHQWV HYHU\ GD\ 7KLV JURZWK LQ QXPEHU P.
ZLWKRXXW KLQGHULQJ WKH HGXFDWLRQDO OLIH 6XIILF
ZLWK PRUH VWXGHQWV DQG FRQWUROOHG QXPEHU R
FRQWULEXWH WR WKH LQVWLWXWLRQDOL]DWLRQ RI HO
LPSRUWDQW IRU GHVLJQ VWXGLRV DV WKH EXLOGLQJ VV
HGXFDWLRQ LV D FRQFHSW GHILQH ZLWK GLIIHUHQW
DSSURDFKLQJ GHVLJQ VWXGLRV DQ HIIHFWLYH FRXUVH
GLIIHUHQW HGXFDWLRQDO PHWKRGV 7KH FRQWHQW RI
LQVWLWXWLRQV VWXGHQW VHOHFWLRQ PHWKRGV DQG
DQG HGXFDWLRQ PRGHV PXVW EH GHYHORSHG PHW
SHUVSHFWLYHV PXVW EH UH DQDO\VHG DQG IRUPDWHV
SURIHVVLRQ > @ &RQVLGHULQJ GHVLJQ VWXGLRV DV
PHWKRGV VXSSRUWLQJ GHVLJQ DQG GHVLJQ SURFHVV E
HGXFDWLRQ V\ VWHP IRFXVLQJ RQ DGGUHVVLQJ WKH GH
GHVLJQ VWXGLRV WR WDNH VKDSH WKH VWXGHQW PX
LQVWLOO UHVSQRVLELOLW\ DQG VHOI FRQILGHQFH LQ
LPSRUWDQW IDFWRU LQ GHVLJQ VWXGLRV ZLWK WKH H
H[SHFWHG WR WKLQN LQ D VRSKLVWLFDWHG PDQQHU
V\QWKHVV DQG WR PDNH DVVHVVPHQWV DV RSHQ PLQ
WKLW VHQVH IDYRUDEOH FRQGLWLRQV PXVW EH HQVX
GHVLJQ SURFHVV \$FFRUGLQJO\ WKH VWXG\ PDNHV WK
JDLQ H[SHULHQFH XQGHU VXSHUYLVLRQ RI DFDGHPLFLD
WR DFDGHPLF PHPEHUV LQ GHVLJQ VWXGLR FRXUVHV
GHVLJQ DQG SUDFWLFH &UHDWH VSDFHV IDFLOLWDWL
,QFUHDVH GHVLJQ VWXGLR FRXUVH KRUV DQG UHGXFH
ZLWKLQ WKH GHSUWPHQW \$QG ILQDOO\ WKH GHVLJQ
DQG VXSSRUWLQJ DFWLYLWLHV PXVW EH FRQGXFWHG
REVHUYDWLRQ ILHOG VWXGLHV DQG RWKHU ZRUNVRS
ZLWK SURVSHFWLYH ,QWHULRU \$UFKLWHFWV ZKR DUH F
DELOLW\ RI FULWLFDO WKLQNQJ 7KH GHVLJQ VWXGLR
LQFOXGHG LQ WKH FXUULFXOD RI HVSHFLDOO\ VHQLRU
SUDFWLFH \$FFRUGLQJO\ WKH VWXG\ HPSKDV]HV WKD
LQWHULRU DUFKLWHFWXUH HGXFDWLRQ KLJKOLJKWLQJ

5HIHUUHQFHV

\$GÕJ.]HO ' 7•UNL\H†GHNL Lø PLPDUOÑN H÷LWLPLQG
.DGLU +DV 8QLYHUVLW\ ,VWDQEXO SDJH
%LHOHIHOG % .KRXOL 6 (\$GÕP \$GÕP 7DVDUÕP)
&RUGDQ g *|UJ•O (dLQoLN % 1XPDQ % øo
<DNDODPDN ø7h gUQH÷L ød0(. ,QWHULRU \$UFKLWH
&RQJUHVV ,VWDQEXO 7XUNH\ 'HF S > @0
0F&HOODQG 3URIHVVLRQDOL]LQJ ,QWHULRU 'HFRUDV

-RXUQDO RI 'HVLJQ +LVWRU\ > @0DVVH\
7KDPHV DQG +XGVRQ 3XEOLFDWLRQV
'HPLUEDú 2 g 'HVLJQ 6WXGLR DV D OLIH VSDFH
6FLHQFHV 0DVWHU V 7KHVLV \$QNDUD S
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ZZZ LLGD RUJ ZKDW LV LQWHULRU GHVLJQ
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3XEOLVKLQJ øVWDQEXO VD\ID
.DSWDQ % 7•UNL\HGH øo PLPDUOÖN H÷LWLPLQ JH
VRUXQ VW 1DWLRQDO ,QWHULRU \$UFKLWHFWXUH
06*68 \$UFKLWHFWXUH)DFXOW\ 3XEOLVKLQJ 1R 2F
.HWL]PHQ * d 0LPDUL 7DVDUÖP 6W•G\RVXQXQ %L
0HNDQVDO (WNLOHULQ øQFHQPHVL \$QDGROX 8QL
7KHVLV \$XJXVW S
g]NHU 6 ,Q WKH FRQWH[W RI LQWHULRU DUFKLWH
0RGHOV *HUPDQ 7XUNLVK <HDU RI 6FLHQFH +DFHW
,QWHUQDWLRQDO ,QWHULRU \$UFKLWHFWXUH (GXFDW
PHPR ERRNOHW 'HFHPEHU
g]W•UN g % *•Q•P•] 7DVDUÖP (÷LWLPLQGH <|QWHP
h]HULQH %LU 'HQHPH ,QWHUQDWLRQDO &RQIHUHQFH
,PSOLFDWLRQV 1RYHPEHU \$QWDO\ 7XUNH\
7X÷OX .DUVOÖ 8 g]NHU 6 ³*•Q•P•] 7DVDUÖP 6W•G
<|QWHPOHUL YH \$W|O\HQLQ 0HNDQVDO .XUJXVXQD
\$UFKLWHFWXUH 'HVLJQ &XOWXUH DQG \$UW 0DJD]LQ
<ÖOGÖUÖP 6 *•YHQø . 0LPDUOÖN (÷LWLPLQGH 7DV
)RUXP 1DVÖO %LU *HOHFHN" 0HPRV ,78 ,VWDQEXO
=RUOX 7 \$NJ•O % (UED\ 0 2QXU ' \$UDV \$
WDVDUÖP VW•G\RODUÖQD IDUNOÖ ELU EDNÖú UHVL
\$UFKLWHFWXUH (GXFDWLRQ QG 1DWLRQDO &RQJUHVV

85/ 7KH FRXQFLO IRU LQWHULRU GHVLJQ DFFUHGL
KWWS DFFUHGLW LG RUJ SURIHVVLRQDO VWDQGDUG